

SUPPLEMENT.

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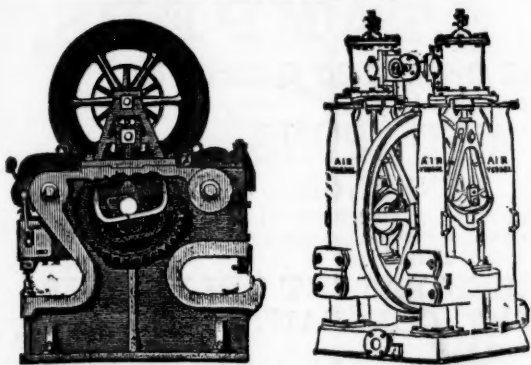
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LONDON, SATURDAY, APRIL 12, 1879.

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PARIS,
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ORDER OF THE CROWN OF PRUSSIA.



FALMOUTH,
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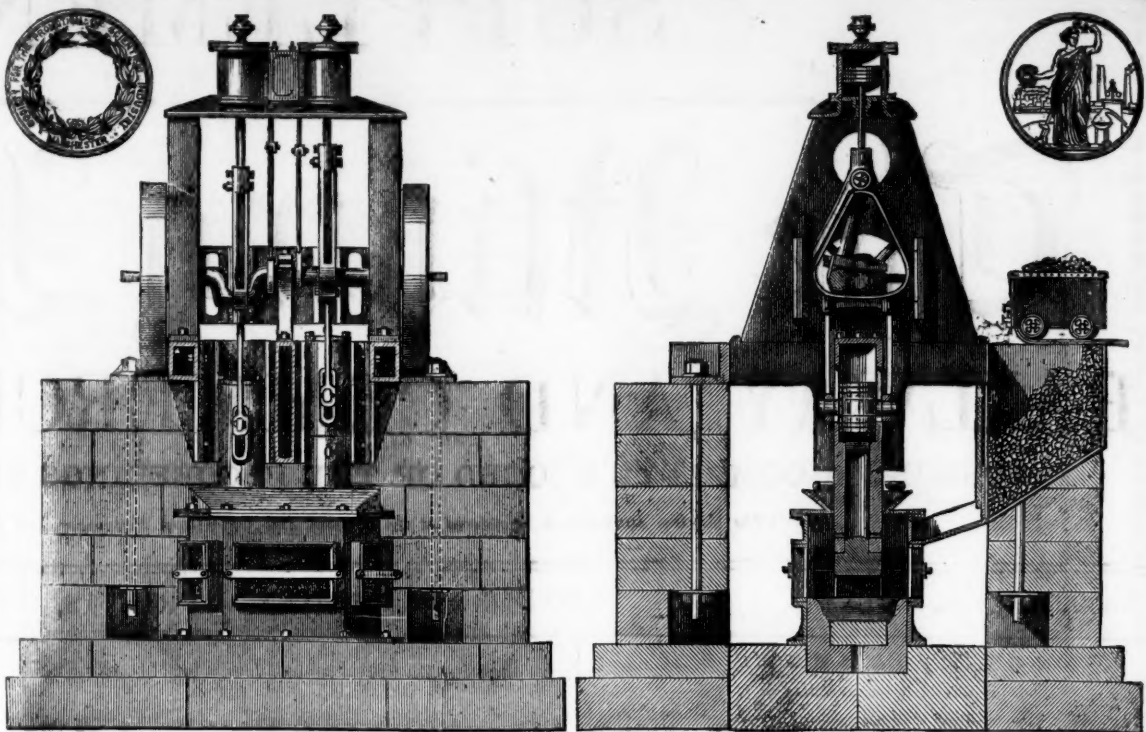
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HOLLWAY'S PROCESS.

SIR.—It is only lately that I have had an opportunity of looking into Mr. Hollway's process, and after a careful perusal of his interesting paper as read before the Society of Arts, and, while endorsing much that has been said as to the ingenuity of the process, I cannot see how it can be made profitable, and so financially, as well as technically, successful.

There does not appear to be any reason why Mr. Hollway should not claim originality for his idea of smelting the sulphides by the combustion of sulphur, instead of by the addition of fuel; and, taking the process as a whole, it appears to be as new as it is possible for any process to be. I have had some little experience of copper extracting and smelting, and I do not think that Mr. Hollway has attempted anything impossible; the whole appears quite capable of being put into practice, always provided that the items of cost and profit are left out of consideration. There are, no doubt, several practical difficulties that will have to be got over before such a process can be made to work satisfactorily; but none of them are, in my opinion, insuperable, or even greater than most really new processes have to contend with. Admitting, therefore, that Mr. Hollway's process can be made to work as a process satisfactorily, the next matter to be considered is the cost of working it, and the profits resulting therefrom, as shown in his statement of costs and profit.

It is scarcely possible to get from the results of his experiments the necessary information for calculating as to what would be the costs and profits of working such a process as he describes. He does not give us, as has been already pointed out by "Miner" in this Journal, the weights of slags, mixed regulus and slag, and regulus which he obtained in the individual experiments. The quantities of these are quite as important, however, as their analyses; and I am, therefore, glad to see from Mr. Hollway's letter, in the Journal of the 22nd ult., that it is his intention to lay before the Society of Arts shortly the results obtained from quantitative experiments. There are several items in his statement of the estimated profits that are scarcely in accordance with the results of his experiments; these, and the statement as a whole, I will now examine.

LOSS OF COPPER IN SLAGS.—He says there is a small loss of copper in the slag, which, however, should not exceed 10 per cent. of the total copper. Taken at the most moderate estimate the weight of slag produced would be as nearly as possible the same as that of the pyrites used, and 15 per cent. of copper in it would be a very satisfactory result. This is lower, however, than any of the results given, and I presume obtained; therefore, I do not think he is justified in estimating his loss in the slag at such a low figure. In his first two experiments the slag made 16 per cent. and 22 per cent. for copper; but his regulus was only 15.85 per cent. and 16.59 per cent. copper. In the sixth experiment the slag made 42 per cent. copper, and the regulus 59.98 per cent. The slag from the other experiments was very foul, for which satisfactory reasons are given. It would scarcely be fair to average the results obtained, as we must allow for the newness of the process and the difficulties inherent to an experimental trial; but I think it is going to the opposite extreme to estimate the copper in his slag from 30 per cent. regulus at less than he actually obtained from a regulus containing only 16 per cent. copper. No one practically acquainted with copper slags will blame me of unfairness, I think, if I were to express my doubts as to its being possible under the circumstances described, and with only sand added as a flux, to produce a slag regularly and in quantity averaging less than double that percentage—30 per cent. If, however, 38 cwt. of silicious flux, as mentioned at page 15, are added to every 20 cwt. of pyrites, instead of having 300,000 tons of slag from 300,000 tons of pyrites, we would have 750,000 tons from that quantity. This might be produced containing a lower percentage of copper, and, granting that such was the case, the total quantity of copper lost in the slag would be considerable, from the enormous quantity of slag produced. This slag would require to contain not more than 10 per cent. copper to take up the estimated 10 per cent. loss. In either case I do not think the loss would be less than 20 per cent., and will take it at this until Mr. Hollway's future results corroborate what is at present only an assumption. The difference between 10 per cent. and 20 per cent. loss of copper in slags is equal to 450 tons copper, which, at 60s. per ton as valued, would reduce the estimated profits by 27,000s. We will, however, reduce the quantity of regulus when we come to price it.

VALUE AND COST OF EXTRACTING THE GOLD, SILVER, AND COPPER FROM THE REGULUS.—The quantities of gold and silver in the regulus, as given in the statement of the estimated profits, are given, through a clerical error I presume, at only about half of that which is necessary to make up the produce. Calculating from the produce I made the quantities 31 ozs. 6 dwts. 16 grs. of silver and 2 dwts. 12 grs. of gold per ton of regulus. A loss of 10 per cent. in the extraction of such small quantities of gold and silver appears to me a very low estimate; but, perhaps, others with more experience in the extraction of these metals will give us their opinion on the subject. Mr. Hollway estimates the cost of extracting the copper and these metals from the 13,500 tons of regulus at 84,350s.; but I deem it advisable, because more correct, to take the Swansea value of the regulus, and so render it unnecessary to assume such an important factor as these costs are in the statement. I have accordingly had the regulus valued by a competent authority at Swansea, and the price, based on yesterday's quotations, is as under:—

Regulus, 30 per cent., at 11s. per unit ... per ton	£16 10 0
Silver, 31 ozs. 6 dwts. 16 grs.	0 10 0
Gold, 2 dwts. 12 grs., no value	Nil.

Total.....per ton £17 0 0

Taking the loss in slags at 20 per cent. we find the quantity of regulus will be 12,000 tons of 20 cwt., equalling 11,439 tons of 21 cwt., by which weight it is sold. This quantity, at 17s. per ton, will represent 194,463s., or 55,537l. less than the amount in Mr. Hollway's statement. Even if we admit for the moment that it is practicable to work with a loss of only 10 per cent. of copper in the slags the amount in Mr. Hollway's statement will still, according to the Swansea valuation, be too high by 31,431l.

VALUE OF THE SULPHUR RECOVERED.—It is not only assumed that the sulphur is recovered, but that the quantity so recovered is equal to 50 per cent. of the total present in the pyrites. I will allow him the benefit of this double assumption in the meantime; but the price at which he values it is too high, and for the following reason:—Sulphur in pyrites, at (say) 6d. per unit for 44 per cent., is only equivalent to 50s. per ton for the sulphur, delivered in this country. This assumed sulphur is valued at the mine at 3s. per ton; to this we should have to add (say) 20s. for carriage to consumers—making its estimated value (say) 4l. per ton here. I am not aware of any advantages of sufficient importance which this crude sulphur would possess that would make it worth 30s. per ton more than the sulphur as sold in pyrites. This reduction in the price of the sulphur on the quantity assumed as being recovered would still further reduce the profits by 108,000s. It may, perhaps, be thought by some that this is rather a low valuation; but when it is borne in mind that the quantity assumed as being recovered has been left untouched, that 6d. per unit for the sulphur in pyrites is by no means its lowest value, and also that this crude sulphur will not for many purposes be available as a substitute for ordinary brimstone, I think, when everything is taken into consideration, it will be found that the valuation, instead of being low, is still too high.

WAGES COST OF WORKING THE PROCESS.—The estimated wages cost of the process is only 1s. per ton of pyrites. This appears a very low estimate, including, as it evidently does, repairs and repairs wages. I will, however, pass this item as it stands, and will wait the further development of the process before taking it out in detail. With regard to the other items I have nothing to say at present. The sulphurous acid and other volatilised products, to

which no value was attached, I will also pass over; but I am much interested to know what number of towers will be necessary for carrying out Mr. Allen's suggestion as to the condensation of the sulphurous acid. To condense every 24 hours something like 1300 tons of sulphurous acid would be no light undertaking; but I believe the difficulty of knowing what to do with it after you got it would not be much lighter.

In conclusion, I will detail the differences between Mr. Hollway's estimate of the profits and those just made. He estimated the profits on working 300,000 tons of pyrites at £165,000

From this I take off—	
For extra loss of copper in slag, and less value of regulus produced.....	£ 55,537
For less value of sulphur	108,000=
	163,537

Amount still left for profit..... £ 1,463

This is equal to a fraction above 1d. per ton profit. In making the preceding remarks on Mr. Hollway's process I have endeavoured to look at the matter as fairly as possible, and have given my reasons for differing from its author. These can be taken at what they are worth, and no one will be more glad than I shall be to find that after all the process can be made a profitable one. Had it not been for the estimated profits I should not have troubled you with any remarks on the subject. GEORGE GATHERAL, Cardiff, April 2.

REDUCING SULPHIDES WITHOUT FUEL.

SIR.—Having observed some adverse remarks upon the practicability of the process invented by Mr. Hollway, I have taken the trouble to extract the subjoined communication which has been published in an American paper, and which will suffice to show not only that the suggestion is practicable, but that the most gratifying success may be confidently anticipated. ENGINEER, Liverpool, April 8.

SIR.—Noticing Mr. James Douglas's note on Hollway's process of blowing air through molten pyrites, I would ask you to give me the use of your columns to state that Mr. W. E. C. Eustis and myself have, for nearly a year, been working on exactly this idea. We had carried on many experiments on a small scale, and had perfectly satisfied ourselves of the possibility of extracting copper and other metals from their sulphides in this way, without the use of fuel, long before we had any idea that anyone else was working in the same direction. We had, indeed, kept the matter as far to ourselves as was possible, though we had taken the precaution to file a description of the method in the United States Patent Office.

Beside the plan which Mr. Hollway describes, of blowing air through the molten sulphides, we had intended, when it was desirable to recover the sulphur, to blow a mixture of air and steam, in such proportions that the H_2S formed by the steam should be the exact equivalent of the SO_2 , which would be formed by the oxygen both of the steam and air, so that the reaction $2H_2S + SO_2 = 2H_2O + 3S$ would enable us to recover all the sulphur which had not been volatilised by the heat before reaching the zone of fusion. If either steam or air were in excess, H_2S or SO_2 would escape with the sulphur, and, by their characteristic smells, indicate to the workmen what change in the proportions of steam and air was needed. It is quite evident that the same general course of treatment would apply to mattes and speisses, from which latter, and from arsenides in general, arsenic could be extracted in the manner just described for the recovery of sulphur.

We had given up the idea of a rotating Bessemer converter, and we considered that a combination of a cupola and reverberatory furnace would be more desirable. The cupola was to be at the side of the reverberatory, and the ore was to be charged in the former, where it would be heated by the passage through it of the gaseous products of the reactions which take place in the reverberatory. The lower part of the cupola would open out into a short and wide passage leading to the reverberatory, so that the lower part of the column of ore would lie in a talus, the face of which would be exposed to the heat of the reverberatory. This, and the passage of the hot products of the reactions from the reverberatory through the ore, would gradually cause it to fuse and run down into the deep basin-like hearth which forms the bottom of the reverberatory. Here it would accumulate and form a bath, through which the air and steam would be blown by tuyeres, which might either be let down through the roof, somewhat as figured in Fairbairn's Iron Manufacture, p. 171, or led horizontally through the sides of the reverberatory. The whole apparatus was to be tightly closed, the top of the cupola being the only exit, so that the gases which would escape from the bath of molten sulphides in the reverberatory would be forced to pass up through the column of ore in the cupola.

The tuyeres were to be at some distance above the bottom of the basin, so as to allow the matte to separate from the agitated mixture of matte and slag which would be formed by the action of the blast. From this the matte could be drawn, continuously or intermittently. The slag was to trickle out from the reverberatory, into a settling basin or fore-hearth, whereby matte mechanically carried along with it might settle out.

The oxidation of the iron and, in case steam is not simultaneously used, the oxidation of the sulphur as well, by the blast of air which the tuyeres force through the bath of molten sulphides, would generate a most intense heat, which would undoubtedly be sufficient to fuse fresh portions of sulphides so rapidly that, when the operation had once been well started, and the apparatus brought up to a proper working heat, no other source of heat would be needed to enable the operation to go on continuously.

We would take this opportunity of putting ourselves on record as having invented this system contemporaneously with Mr. Hollway, and wholly independently of him. HENRY M. HOWE, Boston, March 24.

LIGHTING COLLIERIES.

SIR.—The very fact of our being in difficulties on this head at the date of this letter suggests the subject to be no easy one, else amongst the many able men connected with working coal improvements would have grown, as in most other things, but practically since the introduction of "Davy's gauze," 60 years ago, there has been no change, and I venture to think that the "gauze" cages flame by Nature's laws rather than by any mechanical trick, it must and will hold its own and be retained. Its application is, however, quite another matter.

Carrying on experiments in one's house with coal gas in order to test the behaviour of "safety-lamps" when used in "fire-damp," does not prove much, but we may assume that if a lamp will fire gas outside the gauze in one case it will probably do so in the other. But caging flame is not the only requirement by any means, and I submit that a "safety-lamp" which actively shows the presence of gas in a mine as well as cages flame, is very much safer and of far more practical value than one that only cages flame, and is dull as an indicator of the presence of gas.

It is curious, but nevertheless true, that safety-lamp makers and inventors seldom or never approach the "lair of the lion to study him," and I have been often amused at the expression of surprise that I would trust myself in a coal mine. But there is danger everywhere in the sense that accidents happen at every time and place, and now and then we are suddenly shocked by loss of life in coal mines, and so we are by railways or at sea, but while the loss of life in mining is only at the rate of 1 in 400 of those employed, at sea it is 1 in 75. Inventors might, therefore, venture to trust themselves in order to learn what is wanted.

Now and then some one suggests the "electric light" for coal mining, just as if it would not fire gas equally with a candle. Assuming, however, it would no more do so than will a dull red-hot iron, the electric light is only suitable to space—to areas of cubical contents, length, breadth, and height, and is totally unsuited to localities where space is only in lengths of curved and angular narrow passages, up and down, right and left. People who talk of the electric light for coal mining must be like the safety-lamp inventors and makers, altogether innocent of what strata may be like some hundreds of yards down and a mile or so away, and of "hitches," "faults," "troubles," "upthrows," "downthrows," &c. The in-

ventor who succeeds in adapting the electric light to coal mines or coal mines to the electric light might as well try his hand on guns for shooting round the corner. J. D. SHAKESPEAR, Baron's Court, April 10.

SHOT FIRING BY ELECTRICITY.

SIR.—I am glad to see you are giving increased prominence to this important subject. After close practical experience, extending over two years, I can endorse all you say about its advantages to the miner as regards economy, and especially safety; but, like everything else, its successful application depends on the genuineness of the articles used and the care of the user. The absence of one or both of these essentials has compelled some to abandon the method and give an unfavourable verdict upon its merits. Given a reliable electric fuse, and a good frictional machine, any miner of ordinary intelligence will find it so advantageous that he will never give it up. I have carefully tried several machines with their corresponding fuses, but the most satisfactory results were obtained by the use of Bornhardt's machine and electric fuses, the next in the order of merit being Brain's high tension machine and fuses. Rushen Mine, Isle of Man, April 8. J. BARKELL.

COLLIERY MANAGEMENT.

SIR.—I see "A Colliery Director" again calls the attention of colliery owners to the management of mines, and no doubt he desires also the miners to know that he, as a representative of colliery directors, condemns the system which now obtains in this and other mining districts—that of a certificated manager managing by proxy, as shown so clearly at the coroners inquest consequent upon the death by explosion of fire-damp at the Stanley Deep Drop on March 4. "A Colliery Director" points out the interest side of the question when speaking of the necessity for the system he complains of being abolished. The miner looks at it from another standpoint—safety. The Mines Act of 1872 clearly defines what should be done for the protection of life and limb at all collieries; but in some way or other things happen or are constantly happening quite the opposite of the Act and its intentions, whereby loss of life is sustained, and then, when an enquiry takes place, no one seems to be at fault, although the evidence may be both direct and clear that every one in authority has neglected to carry out the Act under which colliery officials are appointed. In the inquiry into the causes of the accident at the Stanley Deep Drop, it was clearly proved that the deputies had not examined the mine according to general and special rules, the underground viewer had not enforced the rules regarding such examination, and the certificated manager had not daily supervised the management of the mine. Yet after all this was proved before the coroner's inquest, the jury seemed as though they scarcely could find a corner for saying in their verdict that there was any laxity of management.

Mr. Macdonald asked Mr. Cross, the Home Secretary, a question on this daily supervision of mines, as understood and carried out by Mr. Greaves; and Mr. Cross distinctly stated that Mr. Greaves's rendering of that part of the Act meant quite the opposite to the interpretation he placed upon it. Mr. Cross having given this opinion it is probable he will instruct the Inspectors of Mines to report to him how many certificated managers there are having the daily supervision of more than one colliery.

Mr. Greaves had seven pits belonging to different employers besides those owned by himself, consequently Mr. Greaves, as a sensible man, knew that he could not, even in a limited sense, daily supervise seven pits. Neither can any other person, however clever he may be. Therefore the miners of Yorkshire and other counties feel that an alteration in the law is necessitated, owing to the fact that the present Act has been so invaded that its real meaning is set at naught, both by managers, deputies, and others, resulting in neglect from the least to the greatest in authority.

Mr. Wardell and Mr. Gerrard, Her Majesty's Inspectors, both condemned the management, and the mining world are daily expecting to see in the papers that steps have been taken, as were indicated at the inquest, against the managers at the colliery above referred to. It is a great pity the relations of the deceased are not in a position to bring home the responsibility to the real offenders. A compensation bill, drawn on the lines laid down by Mr. Macdonald, is the only thing which will cause such a state of things as found at Stanley and other collieries to be swept away.—Trusting you will insert this in your next. BENJAMIN PICKARD, Wakefield, April 7.

BIRMINGHAM, AND ITS SUPPLY OF COAL.

SIR.—It will be remembered that during the inflated period of 1871, 1872, 1873, and 1874 a cry was heard, "What shall we do for coal?" and great fears were entertained as to our future prospects; nor was this feeling confined to those outside the coal trade, in proof of which many—if not all—mine agents in the Black Country were plunging into the wildest speculations for opening new pits on doubtful land, in order, as I suppose, to have a little of the last black cake to be found in our dear old country. In this state of fright and excitement for gain the advisers in mining industry lost their balance, and plunged overboard in the abyss of the most foolish schemes, many of which at this time have been abandoned, whilst many others remain in a lingering condition awaiting their inevitable fate, which will come as soon as the little remaining vestige of capital is used up, and the sooner the end the better, as "the thoughts of death are worse than death itself."

The Birmingham demand for coal is very great and varied, and doubtless whilst it will prove a blessing to Sandwell Park Colliery Company, so will the colliery prove a great blessing to Birmingham in producing at a small price to the consumer, in great abundance, small coal called engine slack, of which this colliery will abound as long as it works. This arises from two causes: 1st, the friable character of the coal; 2nd, the great depth of coal from surface, with the very heavy weight of between 400 and 500 yards deep of earth upon the coal bed, which crushes it in a great measure to a powder. This destructive pressure will increase as the bed of coal becomes more extensively worked out, from the fact of the covering strata becoming broken up to surface, thus unlocking and breaking every tie which for a time serves as a bridge to stave off the damage of the resistless crushing gravitation of strata after the foundation has been taken from it. So far this is good to the thousands of engine owners who require cheap fuel for their steam boilers, and we all hope of great good also to those who have invested in this colliery enterprise.

The last hundred years' carving at the 30 ft. bed of coal in South Staffordshire has to a very considerable extent reduced this grand deposit to ribs, pillars, and fragments, and these, we are told, when found free from fire and water, are not to be frowned upon, since under favourable circumstances the coal is raised at a very small cost, and giving a large profit to the colliery owner even in these hard times, and but few better investments need be looked for. The price of best house and smiths' coal, &c., from the 30 ft. bed, at the pits of one of the largest colliery owners, is as follows:—Best coal 14s., seconds 9s., lumps 8s., slack for engines 3s. 6d. per ton of 2240 lbs., and cannot raise enough to meet the demand. This is land sale, per carts and wagons, weighed on a machine as near as gold. Some will ask, What does this price, so easily obtained in these days of want and starvation, indicate? The answer is—Scarcity and monopoly! and that those who have it have only to consider the limit of their own desire for gain, and so regulate their price. This is in the centre of our old Black Country, and it is true that good house coal during the winter has been, and is at this time, very scarce, and those who have it, throughout the winter and now, have obtained their own price per ton; in short, we have been paying not only in Birmingham and Wolverhampton a very high price for whatever we have been able to get in the name of house and office coal, but I am told that the people in the Black Country, living near the collieries, have in many cases paid more than we have owing to their being outside the reach of the importers of coal by rail from other districts. It is, therefore, clear that in the midst of coal we are not safe and sure against extortion or starvation (blessed are those who can help themselves, for they shall be helped); and bad as trade has been it is quite clear that but for the

blessings of our railways, during the last winter, we must have been driven to the very worst extremity for house coal. We are told that the best coal for house purposes cannot be raised alone from the 30 ft. bed, and unless there be a great demand for such coal as engines, ironworks, brickyards, &c., require, the get of house coal becomes very limited, and hence arises the scarcity of house coal from our near neighbours, whilst of forge, furnace, or works and brickyard coal they have had too much.

The Cannock and Bloxwich districts have beds of first-class house coal too well known to require comment, in which they have the greatest uniformity of quality. These collieries are so hard pressed for house coal that for any one party to get any great supply seems impossible, especially during the cold weather. I, therefore, hope that our coal merchants will not forget the past, but lay in a heavy stock for us during summer, as but few private houses have room to lay in a large stock for winter. I have just discovered that I have been carried away from the thread of my letter into a subject I could have done better with in another form. I, therefore, drop these points; and again ask the question, Has any good come out of the races for new coal fields, &c., which took place during the inflated period before referred to? and the answer is undoubtedly, in the affirmative—a vast area of coal and coal-bearing strata has been discovered, and although some places have been found so beset with difficulties as to be of no commercial value at the present time, such as being too deep, too great a load of water to contend with, too costly to sink to as long as coal can be got at other collieries or brought from other coal districts for less money than they can reasonably hope to produce at, and perhaps the worst is in some cases a soft and bad quality of coal. Such places, one by one, are closing, leaving a monopoly to the owners of good household coal, and this is an evil over which there is no hope to break down, since we cannot get importations from the nearest outside colliery district for less than from 3s. to 4s. per ton for railway charges, which serves as a protective duty to our great colliery owners.

The question is, Can there be a doubt about our Staffordshire colliery owners, who have a good house coal colliery making very great profits? The answer is clear—such colliery owners who have not very deep pits, and are free of the troubles of the old Black Country water and mines drainage folk, are making cent. per cent. per annum. I have been told of a firm which made 200 per cent. per annum on the capital they advanced, but at a future time I shall hope to take up each point to which I have adverted in separate letters. At the same time my Birmingham friends must under every phase look forward for their gas and household coal being in a very great measure supplied from distant coal fields, as it is quite clear that those who have fine household coal collieries will maintain their monopolies and high price of common coal and fine engine slack, &c. The market has been overdone for some time.

PRO BONO PUBLICO.

NEW SILVER EXTRACTING PROCESS.

SIR,—Some discussion occurred in the *Mining Journal* about a year ago with regard to a new system of treating silver and copper ores, invented by Messrs. Joseph de Baxeres de Torres and Alexis Drouin, of Madrid, and which it was thought at the time would be applicable to the treatment of the ores of the Rio Tinto Company. As is usually the case, the process first secured was found to be somewhat defective, and, in fact, incapable of being turned to commercial account, but the inventors have since remedied the defects, and perfected a process which gives every satisfaction. In its present state the process is applicable to all minerals or ores containing both silver and copper, or one only of these metals, whatever may be the other ingredients with which they are associated. The improvements also permit of the profitable treatment of complex minerals, sulphurets, arsenurets, sulpho-arsenurets, or antimonurets, &c., of silver and copper, very abundant in some districts, but usually of no commercial value, owing to the want of a simple process of treatment. The present improvements vary only in small details from processes which have long been known, yet this small variation changes its aspect from a failure to a success. It has hitherto been impossible to utilise the property possessed by chloride of sodium of decomposing sulphides of silver, to form a soluble chloride from which to extract the silver except by roasting the mineral with the salt at an elevated temperature, which generally volatilises, a considerable portion of the chloride of silver obtained occasioning also considerable loss.

The present process can be made altogether a cold process, for it consists in heating a pulverised mineral containing silver with a solution of marine salt acidulated by nitric, hydrochloric, sulphuric, or any other suitable acid, whereby the transformation of the silver into the state of chloride is rapidly and completely effected, even when cold, without the necessity of a previous calcination, the chloride of silver formed remaining in solution, ten to fifteen hours being sufficient to obtain this result. Also in and by the addition to the ore of a small quantity of binoxide of manganese, whereby the reaction is accelerated and the dissolution of the chloride facilitated. The same solution when cold rapidly dissolves the whole of the copper contained in an oxidised ore. Should the ore contain sulphur, arsenic, or antimony it will be requisite to roast it to a dark red heat, in any kind of furnace capable of producing a very oxidising atmosphere, and it will accelerate greatly the roasting, while obviating the agglomeration of the mineral, by mixing it with a very small proportion of binoxide of manganese.

The dissolution of the silver and copper in the acidulated saline liquor may be effected in any of the known apparatus; it is preferred, however, to use casks provided with double bottoms, abundantly perforated, covered with a cloth to serve as a filter upon which the pulverised ore is placed, and where it is kept in suspension in the acidulated saline liquor by means of a stirrer, to which adequate motion is given by animal or steam power. The liquor saturated with silver or copper is precipitated through the filter into the lower part of the cask, from whence it passes into other casks containing ore not yet subjected to treatment through conveniently arranged pipes or conductors. When the acidulated saline liquor contains all the metal capable of solution the silver is precipitated by copper, and the copper by iron; the precipitated metals are well washed, dried, and then smelted in an ordinary furnace, leaving a liquor holding different salts of soda and iron, to which it suffices to add a small quantity of acid to render it capable of serving afresh for the dissolution of silver and copper. The gangues are also repeatedly washed in a solution of acidulated salt, and lastly with pure water.

In order to hasten this washing, and to extract completely the whole of the silver, either hot or cold solutions may be employed containing any known solvent of the chloride of silver, such as ammonia, hyposulphite of soda, and the like. Chloride of sodium is not the only salt capable of producing the chloridation of silver under the condition specified; all alkaline chlorides and earthy or metallic alkalies soluble in a solution of acidulated water may be used, and will produce the like results; marine salt is preferred on account of its being the easiest to be obtained. The treatment of complex sulphureous ores containing silver and copper, when the silver predominates, is commenced by the extraction of that metal after pulverisation of the mineral by means of the acidulated saline liquor, during which operation the copper is scarcely attacked on account of the presence of the sulphur, whilst the silver is entirely dissolved, and after the complete washing the residue is calcined and treated afresh by the same acidulated saline liquor, which when cold dissolves the copper in a very short time. When copper is the predominating metal the operation is commenced by volatilising the sulphur, oxidising the mineral by means of calcination, treating it afterwards with the saline solution, which effects at the same time the dissolution of the copper and the chloridation of the silver, recovering the latter partly from the dissolution by precipitation, and totally by washings in the manner before stated. The saline solution may be prepared either in special casks or in the reaction casks, first mixing the marine salt with the ore, and afterwards introducing the acidulated water; whichever be the mode of operation adopted the result above stated will be the same. No definite and exact proportions can be given, as the richer the ore is in metal the less quantity of materials is required, and so the treatment may vary in nearly every case. To make the acidulated saline solution, 5 to 25 volumes of salt are used to every 100 volumes of water, and 1 to 15

volumes of acid. This solution is employed in the proportion of 1 to 5 volumes to each volume of ore treated. The quantity of binoxide of manganese will vary from 1 to 15 per 1000 volumes. Any of the known solvents of chloride of silver, either hot or cold, may be employed for the solution of the chloride obtained under the improved treatment or process. Also slag may be treated as well as ores. By means of this process copper and silver can be obtained from the ores or slag thereof, even those of the most complex description, completely and rapidly, and with almost insignificant loss.

Now, as I have before stated, the invention is one entirely of improvement in details, and in its present form it embraces the treatment of ores or slag containing either silver or copper, or both, by the employment of an acidulated solution of marine salt, acting either hot or cold upon any description of such ore or mineral or slag thereof, without the necessity of roasting the ore or slag with salt, in order to obtain the chloridation of the metals specified; the substitution of any other salt in the place of chloride of sodium producing in acid solution the same reactive effects; and the employment of the binoxide of manganese, with the object of facilitating the solution of the silver and the roasting of the ores. In the present form the invention promised to be a brilliant success.

City, April 1.

J. N.

IS IT RIGHT TO PAY ANY PURCHASE-MONEY FOR MINES?

SIR,—It has come under my notice that certain correspondents have recently written letters in the *Mining Journal* under the above heading, but I have only seen those commencing from the 15th ult. For the present, therefore, I must assume that Mr. Salmon and "Actuary" represent the ideas of all the preceding writers, and the two sides of the question, if it really has two sides; but, whether they do or do not, sufficient has been said in the four letters I shall notice to enable any person possessing accurate knowledge on the subject to determine whether Mr. Salmon or "Actuary" is right. The subject under consideration is really one of "value," and nothing else—mere hypothesis cannot, therefore, solve it. It is difficult to understand how any gentleman not in the possession of a life-long experience—so to speak—in all mining matters, coupled with a very considerable amount of mathematical and financial knowledge, can at all approach the subject with any chance whatever of being able to lay down a correct, scientific, and equitable basis of value—such, indeed, as could not be controverted, and would be calculated to guide the public to the truth, and to persuade them of the necessity of following what may have been advanced. The subject taken up is one of very great importance to the public, much more so in point of fact than appears on the face of it, and I am strongly impressed with the idea that a mere toy entering into the discussion merely for the sake of gaining knowledge upon this particular subject should not express an opinion at all upon it—for it is evident that erroneous opinion, resulting from inexperience, however well supported by plausible arguments, resting on a sandy foundation—even if well intentioned—is calculated to injure to a very considerable extent the interest about or in which it is expressed.

Unless, therefore, the status of those correspondents upon this subject is established and well known there is not so much chance of obtaining an important discussion—such, indeed, as could otherwise be expected, and it is clear the same weight would not be attached to it. "Actuary" refers to some former correspondence by Mr. Salmon, which I regret is not accessible to me. Mr. Salmon has given his name and address in the *Journal*, and he was quite in order in asking for that of "Actuary," and many reasons could be assigned why it should have been given. For instance, it could be set up that the term "Actuary" was employed merely as a *nom de plume*, and that the gentleman using it may not, in the proper sense of the term, be a professional man at all, but only a clerk in some office, and, consequently, not possessing the requisite amount of technical and mining knowledge which would fit him as a proper person to enter into and lead a discussion on such a delicate and important question as the one raised, and that he may not have been justified in adopting the course he has pursued, because an important question of such wide-world interest as the one taken up should be discussed by those who are eminent as professional mining men, and best qualified to do so; and, further, that the argument he has set forward—i.e., "for a professional man to give his name and address would appear far too 'fishy' to suit 'Actuary,' as it might create the idea that he wished to advertise himself gratuitously"—is altogether out of the question at issue, for it is not probable that a gentleman being merely an "Actuary" would ever be likely to be employed or called in for the purpose of determining an important technical mining question other than in the capacity of an auditor or keeper of the accounts of some mining company, or making some calculation upon data supplied. On the other hand, it is fair to state that it may also be argued that "Actuary" had sufficient good reason, and was not bound to comply with Mr. Salmon's request; still openness is best, and if "Actuary" still objects to give his name, in fairness to all those who are interested in this subject, "Actuary" should at least instruct the Editor of the *Mining Journal* to announce in it whether "Actuary" is or is not a member of the London Society of Actuaries. This would be a test of his status and *bona fides*, and I would urge upon him the necessity of carrying out this suggestion.

According to the letter of Mr. Salmon of the 15th ult. some former correspondents appear to have asserted that there should be no payment as purchase-money for mines, and in this assumption he very properly disagrees, and says—"For my part I cannot see what reasonable objection there can be to the payment of a purchase-money for a mine as for anything else." I regret he has put it in this form, because if a mine is worth anything at all the amount of the purchase-money is capable of being defined upon a proper and reasonable basis, and not by assumption, and, therefore, the term "objection" would have been better left out. If it can be shown from principle that a mine is worth so much, who will engage to upset the deductions properly arrived at by mere "objection"? Again, he says—"A royalty which has never been developed, and in which successful results are altogether problematical, might be placed in the category of those not to be paid for." Yes, certainly anything "might" be, but as far as the public are concerned the success of all mining adventure may be said to be more or less "problematical"; but I must ask Mr. Salmon who is to determine when "successful" results are altogether problematical? or otherwise, and how is it to be done? In such a case, where successful results are problematical, or may be considered to be so, does he not think that if a gentleman were to come forward and elect to lease that particular piece of mineral land possessing by repute "problematical results" whether or not the landlord would agree to give a lease in the usual way, and also be prepared to back up the character of such "problematical" land by well drawn reports obtained from captains and engineers of mines selected for the purpose? Mr. Salmon further says—"In the view I take of the question I put aside altogether extravagant prices being paid for royalties—that is, prices which the value of the mines does not warrant a purchaser in paying." Very true. I quite agree with Mr. Salmon that "extravagant" prices should not be paid; but what occasion for "extravagant prices" when, by his own admission, the mine has a certain value, and why does he not give a case of value embodying the system upon which he would conduct it?

This is really what is required—figures, in fact, representing the value of a certain mine under certain conditions, and then there would be some chance of carrying on a profitable discussion, and arriving at the truth.

Mr. Salmon's letter of the date referred to, taken as a whole, no doubt fairly represents his views; but then it is not a question as to views or opinions, but one for determination upon principle and by experience in valuing, and there are some things in it which I cannot reconcile. For instance, he says—"In all such cases a vendor has a fair right to expect to be paid for the value of the mine. I have said in former letters that the lion's share of the advantage should go to the purchaser—not only to realise handsome profits, but to provide for contingencies which generally arrive in all mining operations." Now, if the vendor of a mine is to be paid the value of it, what is meant by the "lion's share of the advantage" should go to the purchaser? It is important that Mr. Salmon should point

out what is meant by this expression. But he goes on to say—"I think the all-important question is not that a mine should be purchased for nothing, but what is the fair and equitable amount to be paid, either in cash or shares or both." Certainly that is the question; but then, having gone so far, it is unfortunate that Mr. Salmon only thinks, and did not take a case, and give a definite sum as representing this "fair and equitable amount to be paid." I should certainly advise him to do this, as I am convinced that all the letter writing in the world will not sustain him in the position he has assumed unless he can give a basis of value in all its details, fully illustrated by every figure involved in the calculation. I am well aware that it is "right to pay purchase-money for mines" under certain conditions; but, as Mr. Salmon appears to be the leader on that side of the question, it is for him to support that position, and for other competent persons to agree or disagree afterwards.

What I would propose is, that Mr. Salmon should take an open or unopened mine, of definite area and contents of minerals, as a case in point, giving the cost of development, the duration of the mine, output per year, profit to the proprietor, royalty, and all other particulars connected with the mine, and then the market value to an incoming purchaser—the discussion would then assume a practical form.

In your issue of the 22nd ult. there is a long letter by "Actuary," who appears to be the leader in opposition to Mr. Salmon's views, and as to what he means by some discussion in the City Article I must confess I am out of my latitude, and, therefore, must pass it over; but I would thank "Actuary" if he would send the articles in question to the Editor of the *Mining Journal* for me. "Actuary" says—"But I contend that the capitalist pays for the mine in the royalty which he undertakes to pay to the mine lord." Yes, certainly, if the capitalist were to lease the royalty direct from the mine lord without any intervening party his entire payment would be the royalty or dead rent. This is simple and conclusive. But, then, assuming that the capitalist has not obtained his interest or lease direct from the mine lord, but from the original person, whom we may call the lessee, the capitalist cannot get possession without his consent. Now, this is a case of common occurrence, and the question arises if the lessee has obtained from the mine lord, as is frequently the case, the lease of a valuable but undeveloped mineral property is he really obliged to part with his bargain, from a business point of view, to a capitalist anxious to acquire it without receiving its value? How is it possible for "Actuary" to negative this? It is true he can by assumption set up arguments, but then we must have something more tangible than mere words before a case can be proved, or otherwise. I have not yet seen a proper representative case put. It is for "Actuary" to take the case of a mineral estate, and under existing circumstances such as have been suggested to Mr. Salmon, and show by calculations as well as words the lease of an undeveloped or developed mineral area of a definite extent and contents is worth nothing. I say it is for Mr. Salmon to erect the valuation structure, and for "Actuary" to knock it down. "Actuary" should also well consider the position of the lord of the mineral estate as affecting the question—assuming minerals really exist in the property, such as would seem to justify development, the lessor grants a lease on certain terms, such as shall secure to him a definite annual payment as dead rent or certain rent should the mine not be developed during the interval allotted for that purpose, or so much of the profit or tonnage dues during the existence of the lease should the mine be developed. Now, is it to be understood in such a case that "Actuary" entertains the view that the lessor or mine lord, has nothing to sell in the shape of a royalty commanding a ready and definite sum? This is a point about which he should be very clear and positive, and it is to be hoped he will reply to it fully. I do not consider the figures which "Actuary" has employed in his letter are of any great importance as showing that a mine has no value, and the statement connected with them is, to my mind, altogether ambiguous, and, therefore, I pass them over as inapplicable to the case in point, and not capable of defining a happy case of value in that form.

Why does he incorporate the word "fine," an ancient and should be obsolete legal phrase, which in a general way means nothing as far as mines are concerned? From "Actuary's" letter it seems that Mr. Salmon has formerly stated that the exhaustion of the corpus never lessens the value of the lord's mineral property. It also appears that "Actuary" asserts to the contrary. In case of a mine containing minerals which can be worked to a profit over the entire period of its duration or length of the lease I should say that it can be shown that Mr. Salmon is quite right if the case is taken in a particular sense; but then I think "Actuary" should call upon him to demonstrate the point, and "Actuary" should also show and demonstrate to the contrary, both entering into calculations for that purpose. It is of little importance to the public for one party to assert a thing, and for another to do nothing but contradict it. I contend that this question is not to be determined by mere discussion, consisting of nothing but words, but by the assistance of calculations, and I hope to see both Mr. Salmon and "Actuary" entering upon the task manfully. It is not necessary to draw such comparisons as "Actuary" has done about taking a house or shop, for such cases are not parallel, and do not apply.

Mr. Salmon says, in his letter of the 8th inst. that a certain mine will yield one million tons of ore, and that the mine is at its minimum value; "but if in the course of a year or so the price of ore goes up (say) to 20s. per ton the profit on this million tons of ore would be, in round numbers, 500,000l. Supposing this royalty was then offered for sale to a purchaser or to a company every reader must see that a very high price would be asked and readily paid for it." So far I do not think Mr. Salmon has done credit to himself, or is very happy in thus putting the case, because in his letter of the 15th ult. he says—"I think the all important question is not that a mine should be purchased for nothing, but what is the fair and equitable amount to be paid;" but, in his letter of the 8th inst., because he is of opinion that there is a probability of ore being 20s. per ton, the profit is to be 500,000l., and that a "very high price" would be asked and readily paid for it. Well, yes, if the 500,000l. were to be receivable every year from the mine, no doubt it would command a "very high price;" but I cannot see what Mr. Salmon intended to deduce from this mode of putting, for it must take a certain number of years to extract one million tons of ore under ordinary circumstances, and then the price per ton must be constant over the whole period of developing the quantity estimated, and the 500,000l. would have to be distributed over the entire interval. The price per ton to be realised over a period of 10 or 16 years could never remain at 20s.—consequently, it is the average price that has to be determined for a period during which the ore is extracted. How does Mr. Salmon propose to dispose of one million tons of ore if raised in one or two years? I cannot see that the price the mine would command would be so very high after all.

As far as I am personally concerned I am not inclined to take up the mere disputes of any man, and would not enter into such a discussion as the present except upon principle, and unless I could be convinced it would be conducted with strict propriety. "Actuary" says, in his letter of the 16th instant, that—"It is problematical whether the one million tons can ever be wrought to a profit." Now, this does not sound like the words of a practical man, and it is open to enquiry what real knowledge or information he possesses which enables him to make such a positive statement. It is assumption altogether, and is very unfair, and it is not competent for him to state—"and at the present moment no one could touch the property and fulfil the conditions of the lease without incurring certain loss"—because he wishes to make out apparently that the mine is of no value at all, either now or hereafter. Pray where do we find the conditions of the lease stated? If trade does not justify the extraction of the ore to a profit at the present moment it certainly does not follow that it should not give a profit in the future, and neither "Actuary" or any other man can prove that it will not—the probability is that it will give a profit, but how much is a question to be determined. If instead of 500,000l. profit only 50,000l. were to be obtained from the extraction and sale of the one million tons, and if this extraction should not commence until the expiration of two or three years to come, surely "Actuary" cannot show

that the mine swallow up. It would be prior of accretion to the lord's dues mine lord's legal condition. I think "No doubt calculators in depressed collieries and had no whereas any mine avidity, with a developed are, consequently, it is a mine trees as have been mining ex The end Mines?" by "Actuary" The letter interesting; efficiently a proposition I quite enjoyed but the fact to take up no bearing. When we supposed concerns found him is, it is a condition he will give any purchase Is it to "Actuary" was unable It is to be this very Madrid.

SIR,—I shall view an interest character and Lake as concise to the satisfaction by the This case time when before the shore country's conditions of large sum their efforts failing in they must the title plored the of later of their pro- racter to all the n- possess (after ha the same produce currence of McGill What the enor but a few Now, the copper h- beds, and worked exploration be given fact that was in later ad of comm- perior be minus of results of investor that we With of mines the reason are anxious either the risk ferent w- develop- lation w- ment an with the parting restors property the exp- capital But not fear it is seek, and for ments in capitals consulti- show the while fe- profits a- waited induce cially a- eagerly We h- taking the exp- miners tions co- gards d- and un- cent, pe- our bon- they sh-

that the mine lord's dues are so large as to seriously effect or to swallow up the profit named, or the greater portion of it.

It would be most absurd to assume that it would, and if the proprietor of the mine containing this ore is in fear lest no profit would accrue to him the remedy is in his own hands—to get the mine lord's dues diminished, for if an equitable state of things exist the mine lord's dues should only be a moiety of the profit, and absurd legal conditions conflicting with this should be set aside by consent. I think "Actuary" has missed his way here.

No doubt the present times do not warrant mere jobbers and speculators in entering into mining for the purpose of obtaining immediate profit, but now is the best time for legitimate buyers who have development and honest trade in view. The real fact is, that in depressed times there is no chance whatever for illegitimate speculators—mining men of mushroom growth; consequently, good and bad mines are all one to them, and must be cried down together, whereas in inflated times, such as those not long since passed away, any mineral land would be eagerly sought after and taken up with avidity, and also cried up to the skies as being of immense value, with a view of deceiving the public and pocketing money. Both developed and undeveloped mines of a legitimate and superior class are, consequently, suffering for the many evils committed in the past. It is a misfortune to the country at large that such unmitigated distress as that experienced and the waste of so much capital should have been brought about mainly by those who know nothing about mining except upon paper.

The enquiry raised—"Is it Right to Pay any Purchase-money for Mines?" is no nearer settlement consequent upon the letter written by "Actuary," dated the 13th instant.

The letter of Mr. Stuart, in your issue of the 29th inst., is very interesting; but he, as a "prudent business man," does not give a sufficiently good reason for being on the side of those who negative the proposition—"Is it Right to Pay any Purchase-money for Mines?" I quite endorse his views as to the importance of colonial mines; but the fact of his having failed to procure capitalists in England to take up the particular business matter which he has in hand has no bearing whatever upon the question introduced for discussion. When we consider that it is next to impossible to procure capital—supposing it were required—to aid in working good developed concerns in England it is not to be wondered at that Mr. Stuart has found himself in his present position. The only thing that can be said is, it is much to be deplored that mining is in such an unfortunate condition. If Mr. Stuart should again refer to the question I trust he will give a better reason for his belief that it is not right to pay any purchase-money for mines.

Is it to be understood that Mr. Salmon has yielded the palm to "Actuary"? If so, and it is found that he took up a position he was unable to sustain, so much the worse for the mining interest. It is to be hoped, however, that other gentlemen will take part in this very interesting subject.

Madrid, Spain, March 31.

LAKE SUPERIOR MINING.

Sir,—If you will kindly give me the use of your valuable columns I shall very willingly enlighten Mr. Salmon, or others who may take an interest in the matter, as to the facts regarding the unprofitable character of a large portion of the expenditure made by the Quebec and Lake Superior Mining Association—an explanation I will make as concise as possible, but will amplify by verbal communication to the satisfaction of those who may wish information, if sought of me by the 24th inst., at which date I leave for Canada.

This company was organised under a special charter in 1847—a time when Lake Superior was accessible only by sailing vessels, and before the Sault Ste. Marie Canal was constructed—at which time the shores of the Lake were a *terra incognita*, and the surrounding country an uninhabited wilderness. Under these unfavourable conditions our company sought for sulphurets of copper, and spent large sums in exploitation for this mineral; later on they directed their efforts to the discovery of native copper in large masses, and failing in these operations, as subsequent experience has taught them they must have failed, they became disheartened, and after securing the title for the most valuable portions of the territory thus explored they ceased working their property in 1859. But the light of later days has made it clearer year by year that the existence on their property of extensive ash beds of a precisely similar character to those on the south shore, which are now yielding nearly all the native copper at the American mines, being proved they possess a very valuable property, and justifies them in believing (after having for two years past further tested these deposits) that the same means applied to them as are in operation there would produce similar results. In this belief they are fortified by the concurrence of such men as Dr. T. Sterry Hunt, Dr. Dawson, Principal of McGill University, James Douglas, and other reliable authorities. What these results are may be readily ascertained by reference to the enormous profits divided by companies working such beds that but a few years ago were considered unprofitable.

Now, if we consider that it is within the last ten years that native copper has been produced in such prodigious quantities from such beds, and that it is within five years that silver mines have been worked to any extent on the north shore, and that nearly all our exploratory work was done 20 to 30 years ago, the explanation will be given why we have no dividends to show. It is a well-established fact that the first pioneers in such inaccessible regions as that country was in 1847 rarely realise the profits; these are usually enjoyed by later adventurers, and we feel convinced that in view of the facilities of communication now existing and rapidly increasing, Lake Superior being the great highway to the West, and the present terminus of the Canada Pacific Railway, and considering the wonderful results of silver and copper mining there, the present generation of investors in Lake Superior mines are destined to enjoy the profits that were denied the earlier adventurers.

With regard to the prudence of paying money for the purchase of mines I maintain the opinion that this should rarely be done, for the reason that if the owners of a valuable dividend paying mine are anxious to sell it, it may be taken as *prima facie* evidence that either they fear its early exhaustion or seek to transfer to others the risk they are disinclined to take themselves. It is quite different with parties who may own a mine and have no money to develop it, as is the case with ourselves, it is then a mere speculation whether the purchasers choose to run all the risk of development and have all the profits, or whether they will share this risk with the owner of the mine. In our case we are not desirous of parting with our interest, but are willing to divide with the investors the risk of development—practically giving away our property for the chance of securing half the profits resulting from the expenditure of the capital furnished by the investors, which capital will be principally expended in machinery and mining plant. But notwithstanding the business character of our undertaking I fear it is doubtful if we succeed in procuring here the capital we seek, seeing that we object to furnish a fund for promotion money and for printing those elaborate prospectuses and flash advertisements in half the newspapers of the kingdom, displaying in large capitals the names of our highly respectable directors, solicitors, consulting engineers, and perhaps medical adviser, which would show that for these purposes we have ample means at our disposal, while for the expenditure of money in a way to obtain legitimate profits we have to beg the assistance of contributors! But having waited so long we can persist in declining such adventitious aids to induce investors to put their money in Lake Superior mines, especially as the signs of the times indicate that they will soon be eagerly seeking what they now seem so disinclined to accept.

We have such confidence in our property and proposed undertaking that in view of future operations we have already been at the expense of laying out a farm of 300 acres for supplying our miners with such farm produce as they may require when operations commence. We hold out no extravagant inducements as regards dividends. Our opposite neighbours, in exactly similar strata and under less favourable conditions, are paying from 20 to 200 per cent. per annum, and these must determine our dividend. As for our *bona fides*, the conditions we propose to the investors is that they should furnish 40,000*l.* for the prosecution of direct mining, of

which 30,000*l.* will be for machinery and mining plant, and the balance for sinking shafts and raising ore; also 10,000*l.* from time to time in the search for minerals and partial development, with the view of bringing into market, as circumstances may warrant, the other extensive locations of the company, we transferring our whole property with the understanding that we receive half the profits or half the stock fully paid-up of the new company.

As to the Calumet and Hecla and Silver Islet Mines one never sees the owners of such mines anxious to sell them or offering them for sale.

W. W. STUART,
President Quebec and Lake Superior Mining Association.
Tavistock Hotel, April 7.

THE WYNAAD (INDIA) GOLD FIELDS.

Sir,—In his letter of the 1st instant, appearing in last week's Journal, Mr. Edwin Harris says—"The Alpha and Prince of Wales Companies have only a small stream between them, scarcely sufficient to work 15 stamp heads more than six months in the year." If this be the truth will Mr. Harris kindly reconcile it with the following extracts from his own report, written by him on the spot as manager of the Alpha Mines, and February 28, 1876—"There being . . . besides a permanent stream of water sufficient to work a large number of batteries with the aid of a turbine wheel almost contiguous to the present works. I am quite confident that with 100 stamp heads 100 tons of quartz could be crushed daily, which would yield an enormous profit to the shareholders. . . . I disapprove of the steam power at present employed for working the batteries. . . . I, therefore, would recommend that the present steam power be discontinued, and that a small turbine be substituted." Does Mr. Harris forget the existence of the second stream behind the Alpha hill with a fall of 100 feet? Does he not know that the late Mr. Vernon Lindon in his report to the directors of the company refers to the "water power of two streams" being available on this Alpha property?

London, April 8.

BRITISH TRADE WITH SPAIN.

Sir,—In the *Mining Journal* of March 1 there appeared a letter signed Frederick Burnaby, in which the writer under cover of the above business-like title has cleverly blended amateur chemistry and the prophetic gossip of a worthy German into a flattering description of the Rio Tinto mining operations. It would be infringing too much on your valuable space to follow him in his description of the dense column of "sulphuric acid, so poisonous to vegetation," or of the instantaneous attraction of copper to iron, which sounds quite like a little flirtation amongst metals. Probably those who take an interest in the process of cementation will refer to more accurate authors on the subject—(although it must be admitted Capt. Burnaby's chemical experiments on the Arab Sheikh give a certain weight to his opinion)—whilst, on the other hand, a glance at the quotation of the Rio Tinto shares will show what amount of success has hitherto attended the gigantic operations described by "the German." My object in writing is merely to give a few details about Huelva, which is described as a "most delightful place-of resort for invalids in winter." A small low lying town, built on the River Odiel, Huelva is remarkable for its dirt, bad smells, and defective drainage. Exposed as it is to the river mist it is the playground of calentura (ague). It is true that during certain months of the year the climate is mild; but one cannot live on air alone, even though it be thick with mosquitoes, and invalids require a special amount of comfort. There is not one hotel in the town, and life in the few miserable "posadas" it boasts of would be unendurable to all who value cleanliness and object to vermin. If a house be taken to avoid the misery of the inn it will probably be found anything but watertight, whilst the drafts from the ill-closing windows and doors are trying even to strong people. The meat is poor, the water brackish, the servants ignorant and dirty. These are but a few among the many advantages offered to invalids by this delightful watering place.

The brightness of the prospects of Huelva as a shipping port on the completion of the Seville Railway is equally questionable. The merchandise which goes now to Cadiz from France and Great Britain is carried there by vessels which return laden with wine—a trade that can never be diverted from Cadiz. The length of the passage to either port being practically the same it is difficult to see what inducement besides the pyrites trade could bring extra shipping to a harbour obstructed by a bar, the depth of water over which (20 ft. at high tide) must necessarily exclude all but vessels of comparatively small tonnage.

Capt. Burnaby saw everything in Huelva *en couleur de rose*. The German Director of the Rio Tinto Company, who evinced such Machiavellian diplomacy in dealing with the agents of the International Society, may be congratulated on the lucky chance which led him at so propitious a moment into the company of the wielder of so facile a pen to record his utterances and air the prospects of the Rio Tinto Company.

RESIDENT.

THARSIS COPPER COMPANY.

Sir,—With reference to the actions at present pending in France against this company, I notice a letter in last week's Journal, signed "A Lawyer," which is very misleading, and certainly states bad law. According to him, the fact that the Tharsis Company have got possession—"delivery" he calls it—makes it indifferent whether the title of the party who transferred to them was good or bad. This is simply nonsense, a valid title being absolutely essential. Second, he says that the Tharsis Company have not appeared in the French suit because they are not subject to the jurisdiction of the French courts. But when, in November last, the Tharsis Company acquired from their lessors, the then defendants in the French suit, what they thought was the property of the mines which hitherto they had held under lease, they expressly undertook all the lessors' liabilities, including, of course, liability to the French courts. But, irrespective of this, the question now in dispute before the French tribunals is the validity of the lessors' title, depending upon the construction of the contract between the lessors and the first vendor—a French contract between Frenchmen, and therefore construable only by French law. If the French courts, therefore, find that this contract does not support the lessors' title, or has been voided by the non-fulfilment of essential conditions, it will necessarily follow that the Tharsis title is equally bad. In that case the next step is an action of ejectment before the Spanish courts. An explanation by the Tharsis directors is, therefore, urgently required.

A. B.

THARSIS COPPER MINE COMPANY.

Sir,—I am sure every shareholder ought to thank "A Lawyer," whose letter was published in last week's Journal, for his admirable exposition of the real state of the case between the Tharsis Company and the original owners of the mines worked by the company. I cannot help thinking that these original owners were put to unnecessary annoyance by the contempt with which they were treated by the Tharsis Company, which I presume will in consequence have to pay the French law costs. As the amount, however, will probably not be large, as in France the lawyers do an enormous amount of work for five or ten francs, we may pass that by, and congratulate ourselves that the position is no worse.

But what I have to complain of is the damaging statement published in the circular to which "A Lawyer" alludes, and which I in common, no doubt, with all the other shareholders, received, the evident object being to depress the value of the property. The Tharsis shares are 10*l.* shares, and the circular writer—An Unbeliever in Tharsis at Cent. per Cent. premium—says that the value of a mine share (he adds that mines are proverbially a treacherous property) is ten times the amount of the dividend. I do not admit the justice of the rule, but, taking it to be true, what is the present value of a 10*l.* Tharsis share? It is admitted that the present depression in the copper market is merely temporary, and that the output of the mines is fully maintained. Surely, then, it is fair to take the average of the good and bad years, and it will be found that if no dividend be paid during this year the average for the seven years will be nearly 8 per cent. per annum, the percentage

paid having been 25, 25, 22½, 20, 17½, and 1878 accounts have not yet been published. The average of the above would fully justify present values.—April 8.

SPANIARD.

DON PEDRO NORTH DEL REY MINING COMPANY.

Sir,—Observing in last week's Journal some remarks respecting the Don Pedro North del Rey Gold Mines, perhaps Mr. Goiffon was not aware the engineer from Hayle where the wheel was made only left England on March 24, and probably will not arrive at the mines till April 22. According to Capt. Vivian's reports it is not the engineer that is so urgent, but simply the new ironwork to repair the unfortunate wheel, and without doubt Capt. Vivian's plan will be successful. This ironwork is of vital importance, and it is grievous that it has been so long on the road. I predict shortly we shall hear of the wheel working well, the mine drained, and operations commenced on the rich courses of ore. I criticise all Capt. Vivian's reports, and I firmly believe the work done since Capt. Vivian's management is astonishing. It appears at surface and underground the mines are put in good working trim, and the establishment is becoming one of the finest in South America.

SHAREHOLDER.

London, April 10.

FLAGSTAFF SILVER MINING COMPANY OF UTAH.

Sir,—My attention has been directed to an Editorial note in last week's Journal to the effect that the secretary of this company has resigned. It is true that for some months past I have had in contemplation severing my connection with the company, but the directors have not thought it advisable that I should adopt such a course, more especially in the critical position of the company's affairs. I may add that another director in the place of the one retiring has been elected.—London, April 10.

A. A. DE METZ.

FLAGSTAFF COMPANY.

Sir,—In reference to the announcement in last week's Journal that one of the three directors of the Flagstaff Company had resigned, allow me to state that I am the director referred to; and I would add that the pressure of my own business was the sole cause of my resigning, as my relations with my co-directors—Prof. Vincent and Dr. Jones—have uniformly been of the most amicable and satisfactory character. On leaving the board I have, however, the satisfaction of stating that a gentleman of large practical experience in silver mining has consented to fill my place, and has already accepted a seat at the board. I refer to Mr. G. J. Pritchard, of New Adelphi Chambers, who has for many years worked silver mines in South America. I must congratulate the Flagstaff shareholders upon the acceptance of a seat as a director by such a man in exchange for that hitherto less ably filled by—

G. W. BACON.

127, Strand, April 11.

COLORADO AND FLAGSTAFF.

Sir,—"Fair Play" warns the shareholders of the Colorado Company to beware of the machinations of unscrupulous persons who have combined in a malicious attack to prejudicially affect the value of the shares, and cautions the present holders not to be misled by this "bear" operation. It is just possible that "Fair Play" may err from an excess of confidence in the powers that be, and also from a too exaggerated opinion of the value of the mines. It is quite true the Colorado Terrible was in a position to make profits ere the black-mallers commenced operations, but the fact must not be lost sight of that the capital of the Consolidated Company is now 300,000*l.* It may be urged that the property is far more extensive than formerly, and offers facilities for more frequent and valuable discoveries. That is quite right, but the strength of a chain depends on the tension capacity of its weakest link, and although the area of ground is considerably increased the working capital is rapidly diminishing, and operations have become materially confined. We have been requested, in a previous communication, to have confidence in the present manager, who is the largest shareholder (proceeds from the amalgamation), and who, we are informed, has such faith (!) in the future of the company that he has not parted with a share. I may retort that his friend Mr. Moffat (also a recipient of shares in the consolidated scheme), equally as good a judge of the mines, took advantage of the last "rig," and kindly permitted the English public to purchase his shares without reserve. An inspection of the register might indicate that other parties interested in the amalgamation have followed suit. If Mr. Hamel had been in England instead of Mr. Moffat would he have then retained his shares? The recent resignation of Mr. Morgan and the appointment of the present manager excites grave suspicion, especially as the complaints of Mr. Henty (than whom there is no more honourable man, or more talented miner) and Mr. Morgan were loudly expressed as to the injudicious interference of that gentleman. These English gentlemen were not sufficiently pliable for American institutions, but then they had not thousands of shares to sell. We are desirous to wait until Mr. Andrews, the secretary, returns. Is this an intimation that all differences between the English and American promoters have been adjusted, and the threatened *expose* of certain questionable incidents attending the amalgamation will not be brought to light? Now that one lot of shares have been placed on the market by one clique at an enhanced value (some as high as 7*l.* per share), perhaps it might happily be arranged that the remaining surplus holdings shall be, with judicious trumpeting, offered to the confiding public. Whether the secretary returns or not, and whatever may be his reassuring statements, Colorado shares are at full value (and rather more) until the mine is in a position to pay dividends, and leave good reserves of ore.

I have noticed your recent remarks on the Flagstaff Company that an opportunity had been offered through Mr. Pearson to deal with the property of the company, now in his hands, and your recommendation to the shareholders to get wound-up as quickly as possible and enter upon a new career. I can confirm your statements and agree with your recommendations. I have heard upon good authority that an opportunity of following your advice is likely soon to be afforded to the shareholders.

Fox.

COATING IRON WITH IRIDESCENT COPPER.

Sir,—Many of your correspondents have at different times pointed out the desirability of finding more extended applications for metals, in order to increase the demand, and thus improve the prices of ores; and I think the invention of Dr. Weil, of Paris, for coating iron and steel with copper or nickel in such a manner that the surfaces shall be iridescent, opens such a large field for the employment of metal for decorative purposes that it is especially interesting to miners. He has found that the best mode of preparing the metallising bath and the best proportions of ingredients are indicated in the following directions:—First, 35 parts of crystallised sulphate, or an equivalent amount of any other salt of copper, are precipitated as hydrated oxide by means of caustic soda or some other suitable alkaline base; this oxide of copper is to be added to a solution of 150 parts of Rochelle salt, and dissolved in 1000 parts of water; to this 60 parts of best caustic soda, containing about 70 per cent. NaO, is to be added, when a clear solution of copper will be formed. Other alkaline tartrates may be substituted for the Rochelle salt above mentioned, or even tartaric acid may be employed, but in the case of tartaric acid or acid tartrates a small additional quantity of caustic alkali must be added, sufficient to saturate the tartaric acid or acid tartrate. Oxide of copper may also be employed precipitated by means of a hypochlorite, but in all cases the proportions between the copper and the tartaric acid should be maintained as above, and it is advantageous not to increase to any notable extent the proportion of the caustic soda.

The great advantage of the present process as compared with that proposed by the same inventor a few years ago is that he now substitutes a Gramme machine for the alkaline bath before used. The object to be coppered is to be cleaned with a scratch brush in an alkaline-organic bath, and attached to the cathode, and immersed in the coppering bath, and treated with the usual precautions, when it will become rapidly coated with an adherent film of metallic copper. As the bath gradually loses its copper, oxide of copper as above prepared should be added to maintain it in a condition of

activity, but the quantity of copper introduced should never exceed that above prescribed as compared with the quantity of tartaric acid the bath may contain. If the quantity of copper notably exceeds this proportion certain metallic irisations are produced on the surface of the object. These effects may be employed for ornamental and artistic purposes. According to the time of the immersion, the strength of the current, and the proportion of copper to the tartaric acid, these irisations may be produced of different shades and tints, which may be varied or intermingled by shielding certain parts of the object by an impermeable coating of paraffin or varnish, while the iridescent effect is being produced on the parts left exposed. All colours, from that of brass to bronze, scarlet, blue, and green, may be thus produced at will.

If it be desired to deposit nickel the only modification of the above process requisite is the substitution of precipitated oxide of nickel for the oxide of copper, produced by precipitation as above mentioned. In the above process it will be observed that the introduction of sulphuric acid into the bath is avoided, at least except in such insignificant quantities as may still adhere to the precipitated metallic oxides. Now, I think it will occur to most of your readers that the amount of ornamentation that could be produced with metal work treated by Dr. Weil's process would justify a large outlay for providing the necessary plant. The ornamental iron castings made both in Great Britain and France are really beautiful in form and design, and by the judicious colouration of them with combinations of iridescent brass and scarlet, brass and blue, or brass and green, would produce effects which would ensure their general adoption.

Paris, March 29.

M. L. F.

HERODSFOT MINE.

SIR.—The early success of this mine, emerging again from a calling to a profitable one, with reserves opening up far in excess of what they were in the days when the shares sold at 40s. each, has caused an amount of correspondence in the Journal on Old Herodsfot Mine. If the promoters of that property would call it North Herodsfot it would simplify matters considerably. The position is this—on the northern boundary of Herodsfot a shaft has been sunk about 150 fms. deep, which was used by the Herodsfot Company, and levels driven north as well as south. By far the greater part of the riches and profit derived were from the southern workings. There exists 200 to 300 fms. of virgin ground between these southern workings and the present workings standing as a barrier between the old and new or present workings. The 190 now being driven north, and which is so promising, is the only level coming in the direction of the old workings. The length on the course of the lode it will be observed is very considerable. The underlie shaft from the 106 will be completed much sooner than expected, enabling the shaft to be carried down on the course of the lode to the 215 fm. level.

The first sampling will take place about the 24th inst., and will probably equal the previous three months' production, although hindrances of one kind or another have greatly interfered with the discharge of the amount of leadstuff which would otherwise have been sent to surface; yet a fair profit, deducting from the cost-sheet erection of smith's shop near the engine-house instead of nearly ½ mile away, 600 fms. of wire-rope, arrangement of drum, pulleys, shies, and other things, horses and wagons, &c., which the capital provided has enabled the executive to pay cash for without going into debt. What a contrast was the bringing out of this mine compared with the many limited liability companies, where one-half or three-quarters of the capital is swallowed by promoters, directors, or vendors. To me the present prospect is very gratifying, as justifying the opinion I formed of the mine.

April 9.

H. WADDINGTON.

WELSH GRANITE QUARRIES.

SIR.—Your correspondent, "Another Visitor to Carnarvon Bay District, and would-be Investor of £4000," I have no doubt is correct in many particulars, notwithstanding some allowance should be made for interested parties giving information. That it is the motive of many who recommend such schemes, where there are not the remotest prospects of success, simply to fill their own pockets is unquestionable, still there are very valuable quarries to be got, and if your correspondent will favour me with his name and address I will afford him such information as, I think, will convince him that he may safely put out at least part of his capital, with a certainty of receiving a handsome income on the outlay.

Post Office, Helston, Cornwall, April 8.

H. J. RICHARDSON.

THE CAMBRIAN MINING COMPANY.

SIR.—As a shareholder in the Cambrian Mining Company (Limited) I call upon Mr. Absalom Francis, through the medium of your Journal, to fulfil the promise made by him in your last number—to answer the questions put about these mines the week before in your columns by your Salop, &c., correspondent, and as I do not wish to have a monopoly of his replies, perhaps he will, for the benefit of other shareholders, be good enough to send them direct to you for insertion in an early number of the *Mining Journal*. I would like further to be informed by him, or by some one else connected with the company, the managing director and board of directors refusing to give the information required, as to the following:—On November 6 a circular was issued by the directors to the shareholders appealing for additional capital. For some time previously I was afraid that this appeal would be made, but you can judge of my intense surprise on reading the following paragraph relating to the issue of 4115 shares resolved upon by the directors:—"Shares are now being sold at 3s. per share, and during the last six months upwards of 3500 have been transferred at that price." The directors state this fact, &c. On January 22 I wrote to the managing director asking him to tell me who during the six months preceding November 6 were the fortunate *bona fide* sellers at 3s. because on September 28, when I would have gladly disposed of my present holding, which I wish to do still, at cost price, or 2s. per share. I learned from my usual broker (a highly respectable firm in your city, whose name I subsequently gave to the managing director) that Cambrian mining shares, so far as they could learn, were valueless. Instead of answering my question, he merely said that "the reports sent out by the directors were perfectly true," and flippantly added that "as to what brokers state or publish I cannot in any way control, as it has nothing whatever to do with me." As my broker's report on the market value, or rather worthlessness, of the shares had everything to do with me, however, I again called on McKee to furnish me with the names of the 3500 or more *bona fide* buyers or sellers at 3s. per share as referred to in the directors' circular of November 6, and told him that if he could not comply with my request without consulting the directors it must be laid before them. On February 6 he replied thus:—"I have placed your letter, as requested, before the directors, and they desired me to state that, after seeing my communication with you, they do not see there is anything to add." Our correspondence at that time was closed by my telling him, among other things, that it was easy for the directors to make such an assertion as the one I had exposed, but that when proof of it was demanded they would not, because I believe they could not give it. And now I will be glad if Mr. Absalom Francis, or anyone else, can supply the information desiderated by me.

Since my connection as a shareholder with the Cambrian Mining Company (Limited) I have often wondered what relationship exists between it and Messrs. Hodgkinson and Co., who have been and are almost moving heaven and earth to get rid of its shares. I thought at first that the latter were the company's brokers, but this does not appear to be so. And yet they professed to know, if not all, at least a great deal about the company's affairs, when in September, 1877, after boring me with their circulars, I applied to them for a few shares. For instance, before ordering any I asked them among other questions about the sufficiency of the then paid-up capital, and their reply was that the company had by its arrangements amply provided for its working capital. But when in August last the first annual report made its appearance with a balance unspent of the subscribed capital of only 11577.0s. 2d., and I directed the attention of the managing director soon afterwards to what Messrs.

Hodgkinson had told me the year before, he returned the following consolatory answer:—"I am not at all accountable for any assertions made by Messrs. Hodgkinson and Co."

I cannot conclude this letter without heartily endorsing the remarks of your Salop correspondent in his report to you dated 2nd inst.—"I mention no names, nor do I cast any doubts, but I simply point out that, notwithstanding the high price paid for some of the mines, and the flourish of trumpets with which they were commercially launched, the exploratory work has had to be done with its risks and costs by the purchasers. If I were asked 'Is it right to pay purchase-money for mines?' I would reply, it depends upon the character of the mine, the extent to which it has been proved, and the amount of the price asked."

JAMES R. ANDERSON.

Alderley Edge, near Manchester, April 8.

MINES AND MINING IN CARDIGANSHIRE.

SIR.—I was rather amused on reading Mr. Francis's letter in the Journal of March 29 to find "How the galled jade doth wince," as I never mentioned Mr. Francis's name. That writer attempts at prophecy, or rather at fault, as I never had any connection whatever with either the Monydd Gorrdu or Court Grange Mines, but if I had I should be rather a disbeliever in this mining prophet, considering that with respect to the above mines, which he now denounces as "addled eggs," he says in his History of Cardiganshire Mines—

MONYDD GORDDU.—This discovery may be considered as a very important one, and the mine, with a moderate capital and proper management, is safe (sic) to become a very profitable and lasting property.

COURT GRANGE.—The mine was worked for some years at a considerable profit. The depth obtained by the last company was only 60 fathoms under adit, and in the deepest levels it is supposed a great portion of the lode has been left to stand. The north lode remains unwrought for the entire distance of the set—more than a mile—and this lode itself would be worthy and richly deserving of a good trial being made, &c.

Whilst quoting from this valuable authority may I be allowed to give one more excerpt, which refers to the mine immediately to the west of South Cambrian—

EAGLEBROOK.—The reward the present company so justly merits is now undoubtedly soon to be realised by substantial dividends. The machinery, &c., is not to be excelled, if equalled, by any mine in the county.

This is 1874. Results 1879, no dividend ever paid, and the machinery sold by auction last year for somewhere about 6000l. South Cambrian shareholders make a note of this.

April 8.

G. I.

MORFA-DU MINE (LIMITED).

SIR.—This mine seems to be very steadily and surely making its way into a large dividend position. There is no falling off in the zinc ore, but as depth is attained I am confident larger masses will be found. The rise in the value of all metals should enable the management to obtain a better contract after the expiration of the present one; some of the surplus profits should be directed to the prosecution of the drive in the great white rock, of similar confirmation and of the same nature as in Parys properties. I cannot understand calling these shares at a discount with but 70000l. capital issued. I have every belief that the property is capable of returning all the capital in a short time. On development it will, I think, be found to be worth nearer 70,000l. than 7000l. Any investor seizing the present opportunity to purchase this company's shares will, there is little doubt, find himself well rewarded. The shares should not be sold at the present price, and the remedy rests with the proprietors. The ore in which gold and silver are to be found in this mine ought again to be analysed to ascertain if more valuable than when found previously.

MINING ENGINEER.

Chester, April 9.

MONYDD GORDDU, ITS MANAGEMENT, &c.

SIR.—Seeing a letter from Mr. A. Milsted in last week's Journal relative to some remarks made by me in the *Mining Journal* of March 29, I have only to say to that gentleman that I have nothing whatever to say, or wish to say, about the enormous expense they have incurred in making the "big reservoir" at Craig-y-Pistill, and I hope it may answer their most sanguine expectations. I may assure Mr. Milsted and every shareholder connected with the Monydd Gorrdu Mine, as well as Court Grange, that I wish them every success, and do not doubt if the mines were properly managed they would become a source of profit to the companies working them.

Mr. Milsted says—"We have quietly pursued the even tenor of our way, and what is more, have paid our way, for, as the Aberystwyth banks and tradesmen can testify, when money has not been forthcoming from other quarters I and my partner have come to the rescue." Now, I may say, I never said anything about the non-payment of the mine account, but I now say, if mistakes and blundering without end were not made in loosing the courses of ore, and the time and cost of finding them (seemingly to the great astonishment of the local manager) that the mine would have long since been in a situation to have made the vast returns at which your correspondent, Mr. James G. Green, thinks "it may be a matter of surprise to me to know." I shall say no more about this, and only remark, as to Court Grange, that the machinery has swallowed up all the capital—a fact too well known to the shareholders to be contradicted. And now as to the pumps being out of place at Goginan, I suppose we may presume they are now in place at the celebrated Blaendyffryn Mine, where, for an expenditure of about 10,000l. (I estimated for the outgoing company and for Mr. J. G. Green, the incoming party), they had raised and if dressed 60l. worth of silver-lead ore, and 44. 10s. worth of this 60l. was really made ready for sale.—Goginan, April 7.

ABSALOM FRANCIS.

CAPT. SOUTHEY, OF WHEEL JANE AND THE CHIVERTONS.

SIR.—It is to be regretted that it was necessary, yet it was a pleasure to notice that in the *Mining Journal* of Saturday some justice was done to as honourable and straightforward a mine agent as Cornwall possesses—Capt. Richard Southey, of Wheel Jane and the Chivertons. It was truly said that no agent has had more unfortunate circumstances to contend against; not only had he a mine to work whose eyes were picked out, whose plant had been left to go to decay, and whose whole surroundings were unsatisfactory, but he had also to battle through the disheartening effect of slander. Yet he has through his straightforward work and management made the mines to pay, and had it not been for the awfully depressed state of the metal market West Chiverton would have continued to pay regular dividends. Let me say, that from what I saw there some six months ago, when I was underground to the deep workings, I feel quite satisfied that there are good times yet in store for the shareholders of West Chiverton. Wheel Jane also will, with a slight advance in tin, pay dividends, as all above 40s. a ton is profit.

It seems strange to me that the local press should lend themselves to traducers. Cornwall should rather be proud of a man who has done more for its welfare than all the big guns who are worshipped there, and who by paying dividends instead of making legitimate calls gave a fictitious value to some mines, thereby tending to bring discredit on mining—a discredit that has been its bane during the last five years, and which it is only now shaking off. Had Cornwall only a few more mine agents of the same stamp as Capt. Southey it would soon again be the foremost among mining counties as of old. One satisfaction Capt. Southey has over and above the consciousness of doing his duty is that he has all along had the confidence of his employers (I should rather say his fellow-adventurers, as he has a stake in each of the mines under his care); this is shown by the way he is supported by them, particularly by those who know him best. As to myself, I have had the privilege of being able to speak of him as "our" Capt. Southey for the last ten years, and am pleased to be able yet so to speak of him, and look forward to the time, now near at hand, when his early love will make a name for him and for Cornish lead mining not second to West Chiverton in its most prosperous days. Here he evinces his attention and business capabilities, and his continued care of it will, I have no doubt, soon give him his reward in complete success. He has in it plodded from level to level till now the stopes in the 74 fm. level are producing "splendid silver-lead," with a run of ore in the end worth 1½ to 2 tons per fathom, with the floor so good as to decide the sinking the shaft 10 or 20 fms. deeper this year. To enable this to be done the pit-

work has been changed from 12 in. to 15 in., so that there will be no stoppage from the water, which comes freely from the lode, showing its prospective value. This is but one point it the mine; and no doubt soon the mining public will find that Capt. Southey can open out a new sett as well as he can revivify an old one. I shall not name the mine, as this is not written to puff it. The shares are well held, and not often *bona fide* on offer. I only mention it to point out that Capt. Southey has other laurels in store for him besides his success in Wheel Jane and West Chiverton.

Another circumstance I am glad to notice in Saturday's *Mining Journal* is the growing favour of the Cost-book mines and Cost-book principles. This is shown by your Cornwall Correspondent's letter, also from the opinions expressed by some of the brokers. I have no doubt of it, and from the facts placed before your readers in the Journal of March 15 there can be no doubt of it, that cost-book is the best plan to adopt in opening out mineral property. Should it, however be deemed expedient to form a limited company, let it be as like cost-book as possible. Do not calculate the capital at the least possible expenditure, but let an ample sum be named, and only at most (say) 10s. in 1s. be called up at once, the rest to remain to be called up as wanted. Had this plan been adopted some few years back a great many of the hundreds of defunct limited companies would now be likely to repay the shareholders. I trust during the coming improvement those who are inclined to invest in mining enterprise will take the warning given by the collapse of so many limited companies.

J. B.

[For remainder of Original Correspondence, see to-day's Journal.]

THE SCOTCH MINING SHARE MARKET—WEEKLY REPORT AND LIST OF PRICES.

During the past week the tendency of prices has been generally upwards, owing to the easy state of the money market, and a return of confidence as regards some improvement in trade. Business, however, has lately been more restricted, owing to the approach of the Easter holidays, and in some cases it will be found shares are rather pressed for sale, and prices declined, owing to exceptional sales, thus affording investors great advantages in putting out their funds. The condition of general trade, though very quiet, continues to be viewed as steadily improving, and the Board of Trade Returns for last month compare more favourably.

In shares of coal and iron companies, the principal movement is an advance of 2s. 10s. per share on Bolckow, Vaughan, & Co., owing to the success of experiments on a large scale with this company's new process for manufacturing steel from Cleveland iron ore, and it is expected this industry will soon take the place of the iron rail trade, which was so important some years ago. Scottish Australian are also 2s. 6d. higher, but Arrol's 10s. lower. Benhar have been sold at 12s. 6d., but 13s. 6d. is now being offered for them. The iron market has again resumed its upward tendency, and there are clear signs that the tide of improvement has now set in. The Chillingham meeting passed off favourably on Tuesday, and there have since been more enquiries for the shares. The Scottish-Australian sales for January were 18,539 tons. Nearly all the Durham pitmen have struck against 15 and 10 per cent. reduction, but it is said they will not be able to hold out. At the eight collieries of the Consort Company, where 5000 hands are employed and upwards of 1200 tons of ship-plates are made weekly for the Clyde, the 160 puddling-furnaces can be kept going for some time from their accumulated stock of coal. Andrew Knowles and Sons are at 12s. (25s. paid); ditto 11s. (20s. paid); Bilbaird, 20s. Bilson and Crump, 52s. 6d. Bolckow, Vaughan, & Co., 62s. 10d.; ditto (stock), 112s. ditto (B), 36s. Chapel House, 27s. 6d. to 32s. 6d. Cardiff and Swansea, 15s. to 25s. Ebbw Vale, 67s. 6d. to 72s. 6d. Monkland (preference), 50s. to 60s. Muntz's Metal, 47s. 6d. prem. Newport Abercrombie, 5s. Omoa and Cleland, 5s. to 6s. Pelsall, 10s. 4d. Rhymney, 14s. Scottish Australian, 35s. to 40s. Sanwell Park, 14s. South Wales, 45s. Thorp's Gawber Hall, 20s. W. Cooke and Company, 45s. 4d.

Shares of foreign copper and lead companies have advanced. A good rise is expected in copper if the report of hostilities occur between Bolivia and Chili. The Pannellio Company accounts for six months, ended Dec. 31 last, show a net profit of 9000l. The devices to hand from the Yorkshire Peninsula Mine continue favourable, and the manager states that apart from the low price of copper their prospects are better than at any past time. The ore returns are 217 tons, of 17s. per cent. shipped, on hand 204 tons of 14s. per cent., and 1100 tons of dredge ore, of 5 per cent. Cape shares have advanced 1s. Tharsis advanced from 21s. from which they were released to 21½s., at which they are at an advance of 8s. 9d. for the week. Anamillos are at 25s.; English and Australian, 27s. 6d.; Fortuna, 80s.; Linars, 80s.; New Quebrada, 42s. 6d.; Pannellio, 25s.; Rio Tinto 5 per cent., 83½s.; and Yorkshire Peninsula (pref.), 12s. 6d.

Shares of home mines are in demand, and most prices are rising. The copper, lead, and tin markets all seem inclined to rise. The next sale of the Glasgow Caradon Company, computed 190 tons, for April 17, is the same as last month's sale, but in the month of April for some years past the sales have been from 225 to 260 tons. Shares in the leading tin mines are steady, although the price of tin for the moment looks dull, because stock is scarce, and if another rise in tin comes soon shares will only be obtainable at extremely high prices.

In lead mines the most promising investment appears to be West Asherton. The lode at Rhyddalun is opening out splendidly, and worth in places 6 tons to theathom. West Chiverton shares should also be secured for a rise, as the mine is as good as it was at this time last year, and a call of 3s. 5s. has recently been paid; the shares were then 10s. to 12s. each. The East Roman Gravel Company, to work West Tankerville, is to be registered at once. Caron are at 17s. 6d.; Comb-martin, 5s.; Carn Brea, 31½s.; Cook's Kitchen, 50s.; Dubby Sike, 4s.; Dolcoath, 28½s.; East Fock, 14½s.; East Van, 40s.; Great Laxey, 14s. to 17s.; Green Hurth, 5s.; Kilbreth, 2s. 6d.; Mellanour, 75s.; Morla Du, 12s. 6d. to 15s.; Mollie Moor, 2s. 6d.; New Cook's Kitchen, 35s.; North Hendre, 5s.; Prince Patrick, 17s. 6d. to 22s. 6d.; Parracombe, 5s.; Penstruthal, 1s. 6d. to 2s. 6d.; Pant-y-Mwyn, 35s.; South Condurrow, 12s.; South Frances, 10s.; South Molton, 2s.; Teesdale, 20s.; Tincroft, 10½s.; West Basset, 5s.; West Wye Valley, 15s. to 20s.; West Frances, 5½s.; West Tolgu, 20s.; Wheel Agar, 80s.; Wheel Killy, 2s. 6d. to 5s.; Wheel Orebore, 5s. to 8s. 3d.; Wheel Grenville, 70s.; Wheel Jane, 20s.; Wheel Peavor, 9½s.; Wheel Ury, 15s.; Wye Valley, 35s.

In shares of gold and silver mines, Richmond shares were at 8½ to 8¾, but have now improved at 9 to 9½. This week's run is announced at \$60,000, the message adding that Rickard's estimate of reserves will prove correct. The call of 2s. on Don Pedro shares has not caused the shares to come lower, and it is expected from the manager's reports that they should rise. Three weeks' run at the Almada and Tinto has yielded \$5000, and the Pestarena United gold returns for March are 471 ozs., from 743 tons amalgamated. The profit at Port Phillip for the month ended Jan. 29 was 10411l., and for the month ended March 26, 1067l. Australasian mines are offered. Colorado United are at 40s.; Eberhardt, 92s. 6d.; Emma, 2s. 6d.; Exchequer, 3s. 9d. to 5s.; Flagstaff, 3s. 6d. to 5s.; New Zealand Kapanga, 10s.; Rossa Grande, 1s. 6d. to 2s. 6d.; St. John del Rey, 270s.; Sierra Buttes, 42s. 6d.; Santa Barbara, 4s. to 4½s.; Santa Ana, 2s. 6d. to 5s.; Santa Rita, 4s. to 5s. Shares of oil companies, Broxburn are 2s. 6d. higher, and Uphalls 5s. lower. Young's Paraffin have been done at 14½ and 14¾, at the latter price marking an advance of 2s. 6d. per share.

In shares of miscellaneous companies there is little business doing. London and Glasgow Engineering are now quoted ex div. at 15 to 20. Milner's Safe, 7½s. Palmer's Shipbuilding (B), 15½s. dis. Phospho Guano, 5½s. to 6½s. Val de Travers Asphalt, 80s. In wagon companies' shares Scottish (new) are 10s. lower at 40s., the original shares having been sold at 6 and 6½. Prices of others are—Birmingham, 13s.; Bristol and South Wales, 6½s.; Gloucester, 6s.; Metropolitan, 45s. prem.; Midland, 7½s.; Railway Carriage, 7s.; and Swans, 40s. In chemical companies' shares prices are—Lawes, 8 to 8½; Langdale's, 82s. 6d. to 87s. 6d.; and Newcastle, 20s. to 22s. 6d.

The following calculations show the yield per cent. on money invested at present prices in the shares named, based upon the last average yearly dividends being maintained:—On coal and iron companies' shares—Andrew Knowles and Sons would yield 10½, Bolckow Vaughan (A) 4½, ditto (B) 4½, Charles Cammell and Company 6½, ditto 6 per cent. (debentures) 5, Henry Briggs, Son, and Company (A) 3½, ditto (B) 4½, John Brown and Company 7½, ditto 5 per cent. (pref.) 5, Parkgate 4½, Staveley (A) 5½, ditto (B) 5½, ditto (C or D) 4½, and ditto 5 per cent. (pref.) 4½. In wagon companies—Birmingham would yield 7½, British 8½, Metropolitan 7, North Central 8, Sheffield 6½, and Yorkshire (C) 7½. Great Laxey Mine would pay 8½, St. John del Rey 12½, and South Frances 15. Among miscellaneous investments Earle's Shipbuilding may be mentioned to yield 9½, Milner's Safe 6½, United States Rolling Stock 6½, and Val de Travers Paving 7½.

CLYDE COAL COMPANY.—At the meeting of this company, last week, information was given of the result of the inspection of their collieries at Hamilton. The engineer thought that, while the Hamilton Colliery was a valuable property, with excellent machinery and fittings, the directors should endeavour to sell the Spittalhead section when a favourable opportunity occurred. The Chairman strongly urged the shareholders to take up the balance of 6000l. of the company's debentures, as the remainder had been subscribed for on these conditions. It may be noted that the total issue of those 6 per cent. debentures was to be 15,000l., to run five years, but with an option to the company to redeem them at an earlier date by paying 6 per cent. premium. The money to be obtained by this issue, and by other arrangements which are in progress, will, it is considered, be sufficient to carry on the company satisfactorily, so that the shareholders would be in a position to benefit as soon as a revival of trade takes place.

BIRMINGHAM RAILWAY CARRIAGE AND WAGON COMPANY (Limited).—The annual report of the directors of this company stated that the balance of revenue account for last year was 22,048l., including 3879l. brought forward, and deducting the 10 per cent. interim dividend on the ordinary capital, and fixed charges paid in August last, a balance of 12,300l. remains, which was appropriated in the following manner:—3009l. in payment of a dividend of 6 per cent. on the preference shares, and 6747l. in payment of a dividend of 10 per cent. on the original capital; 2000l. for bad and doubtful debts, and 553l. to the credit of revenue account of the current year. A number of wagons have been renewed during the year, and the cost charged to revenue. A considerable number of old rental wagons have also been sold, and the difference between the cost and selling price charged to the de-

which will also be worked by the 60-ft. water-wheel. It is reported that at the bottom of this shaft there is a lode worth 3 tons of lead to the fathom, and the only reason for ceasing to work it was the influx of water, which they had no means of overcoming. We are now forking the water from the mine by the means we have had, so as to commence at the bottom fixing the larger pumps, and we purpose to make everything in the shaft ready at the same time that the surface work is being done. We are dressing up a parcel of lead got chiefly from the stopes at the adit level, which can be made ready in a short time. Taking into consideration the several promising points above named, we cannot help thinking that when the mine is properly developed it will, and must, become remunerative to the shareholders. This conclusion is the result of a careful investigation of the mine, coupled with a long practical experience of other mines in similar conditions.

The CHAIRMAN said he had nothing to add to the information contained in the report. Everything was going on well at the mine. Some time elapsed before they could get a suitable wheel, and there had been some delay on that account. If the directors had ordered a new wheel of the same size it would have cost £400, and it would have taken six or eight months to make and erect; but the present wheel would be got to work for £600. Two of the gentlemen present had recently visited the mine. The agents were very sanguine of success, and expected in a short time to be operating upon a fine course of lead. He moved the adoption of the agent's reports and accounts.

The resolution was seconded and carried. Mr. J. Y. Watson was re-elected a director, and the election of Mr. R. Spence as a director, in the place of Mr. H. W. Lamb resigned, was confirmed.

Mr. E. Ashmead, public accountant, was then elected auditor, and the meeting broke up.

LINARES LEAD MINING COMPANY.

The half-yearly general meeting of shareholders was held at the company's offices, Queen-street Place, on Thursday.

Mr. W. Cox in the chair.

Mr. H. SWAFFIELD (the secretary) read the notice convening the meeting, and the Chairman having declared the meeting duly and properly constituted, the reports and accounts, which had previously been circulated among the shareholders, were taken as read.

A SHAREHOLDER said there was one point in the accounts upon which he would like information before they went further. The report referred to the low price of lead, yet the accounts showed that they had sold about 1270 tons of first-class lead for about 22,000*l.*, which gave about 1*l.* 1*s.* 6*d.* per ton.

The SECRETARY explained that this was because the purchaser paid them for the silver beyond 5½*oz.* per ton which the lead contained; the better price shown included both the lead and the silver.

The CHAIRMAN said that in moving the reception of the report and accounts he had but very few observations to make. He had been connected with the company for 30 years, and up to the time of the last meeting the lowest price of pig-lead had been 1*l.* 1*s.* 6*d.* per ton. He told them that he believed they had sold at that price, but on reference he found that 1*l.* 7*s.* was the lowest price at which the Linares Company had sold. During the past six months, however, they had sold at 12*s.* 15*s.* per ton. They hardly thought that even with cutting down cost they could realise profit at such a price, but the mine had been so good that in addition to making some profit they had added 500 tons of ore to the reserves in the mine. He need scarcely tell them that they had diminished the production, for as men of business they thought it unwise to raise their lead and sell it at 12*s.* 15*s.* per ton. On the 500 tons, taking it at only 6*s.* per ton, it gave them 3000*l.* They had recently had a sharp rise in the price of lead, and at once took advantage of it to sell as much as they could at 14*s.* 15*s.* per ton. The market has since declined, and to-day the price was 14*s.* 5*s.*, and the directors had just determined not to sell any lead for a fortnight. They considered that the present depression could only be temporary, for the English lead mines could not raise the ore at the price it now sold for. Their superintendent in Spain says there are not five others in Linares at work, whilst, when prices were good, there were 20, 40, 50, or 60. The production was thus lessened both in England and Spain, and the demand was going on the same, so that the price must rise, and he looked hopefully for the day when they would again have good dividends. Except for one very short period they were never, so far as concerned the mines, in so good a position as at present; indeed, they must have a good mine to turn out 270 tons per month, and increase the reserve by 500 tons. The shareholders might rely upon himself and the other directors doing all in their power to secure the interest of the company. He concluded by formally moving the resolution.

A SHAREHOLDER enquired whether the low price of lead did not arise from the large production of lead in America?—The CHAIRMAN said that the price of lead in America was 23*s.* per ton, and the consequence was that they had shipped from London to China 2000 tons of lead during the last month.

The SHAREHOLDER asked why the Americans could not export lead to this country?—The CHAIRMAN said that the American duty of 9*s.* 2*s.* per ton so kept up the price of lead in the States that they could not compete with European lead.

Mr. TAYLOR, in seconding the resolution, said that, looking at the affairs of the company during the past year, they had good cause to be satisfied with the accounts now put forward. The American market was supplied with lead, but it was of a quality which they would scarcely touch at New York, as it was contaminated with antimony and other impurities. If ever we have a Government which will get rid of the duty on tea altogether we should sell a great deal more lead to China, as the American lead is altogether unsuited for the China market, as it cannot be rolled as it is required to roll it in that country. He was glad to say that their workmen at Linares had behaved handsomely, and accepted reduction after reduction in their wages as the price of lead went down, fully appreciating the fact that unless those reductions were submitted to the mines must have been stopped, as so many others had been in the district. Their mine costs were 13,021*l.* in the last half year, and 10,714*l.* in the accounts now presented, the reduction being 2007*l.* They had, of course, diminished production, but that was only the same as had been done elsewhere. The Government Mine was cut down from 1800 tons to 300 tons, and Beaumont and other mines had been cut down in the same way. In the North of England, in Wales, and elsewhere, the production had also been lessened, and the demand for lead had very much increased during the last 40 years. Their own mines were very valuable, and upon any improvement would be able to produce all that is required, and they were well provided with machinery. The discoveries in the Linares Mines during the past six months had been important, and during the past three or four years it had also been proved that the lead in the Linares district holds in depth, which was formerly supposed not to be the case. The price of the first-class lead having been referred to he might say that the silver in their ores amounted to about 25,000*l.* per annum. They sold the lead on the Newcastle scale, 5*oz.* 1*oz.* under 10*oz.* and 6½*oz.* over 10*oz.* per ton for desilvering, the remainder being paid for at the price of the day for silver, which had for the past six months been about 5*s.* 4*d.* per ounce.

A SHAREHOLDER enquired why Quintinos, which appeared to be realising no profit, had ever been purchased?—The CHAIRMAN said that Quintinos had given them profit every year since it had been in operation until the last half-year. They had been producing 120 to 125 tons of ore per month, and the last two or three reports showed Quintinos to be improving. They must remember that both the Spain and the Americans when he was there ten years ago believed the lead to be shallow, and at old Pozo Ancho they stopped at 120 fms. because it had got poorer and poorer. About 18 months ago he was not satisfied, owing to the improvements in other mines in the district, at their having stopped old Pozo Ancho, and with the sanction of the meeting operations were resumed. They were now at the 135 fm. level, and the lode was improving very materially, and he believed that by the time they reached the 150 fm. level they would find ore as good as at the shallow levels, and have the same valuable mine there.

Mr. TAYLOR, in reply to a SHAREHOLDER, explained that the railroad ran direct from the station at Cordova into the yard of the mine at Linares.

A SHAREHOLDER enquired whether the directors thought of connecting the Cordova works with the Belmez line?—The CHAIRMAN said they had intended to do so, but the conditions which the railway sought to impose were impossible to accept. All the ore would have had to go to Malaga, and not an ounce to Seville. Now, the line from Linares to Cordova belongs to the company that goes on to Seville, and the loss of having to ship exclusively at Malaga would have been greater than the cost of carting at Cordova. The directors were ready to sign all the clauses of the agreement except that condition. Without that clause the Belmez line would have got some of the traffic to Malaga, but the Linares Company must in their own interest retain the right to ship at either Malaga or Seville at their discretion.

The reports and accounts were then unanimously adopted. Mr. Henty was re-elected a director, and Messrs. Agar and Carter were re-appointed auditors, the proceedings terminating with the usual complimentary vote of thanks to the Chairman and directors.

ALAMILLOS COMPANY.

The ordinary general meeting of shareholders was held at the offices, Queen-street Place, on Thursday.—Mr. WILLIAM COX (in the unavoidable absence of Mr. John Phillips Judd) took the chair.

Mr. HENRY SWAFFIELD (the secretary) having read the notice convening the meeting, the report and accounts were taken as read.

The CHAIRMAN said he was sorry to say that he could not congratulate the shareholders, nor himself as a shareholder and a director, on there being any dividend this half-year, but the mine was certainly in a very good condition—in fact, in a better state than it had been during the last five or six years. The mine looked more like turning out ore in paying quantities than it had during the time that he had been connected with the company. Most of the shareholders present had already heard what he had to say on the price of lead at the previous meeting, and it would, therefore, be unnecessary for him to go over that matter again. He was, however, in hopes that better times were coming, and as there had been a great improvement in the mine he had no doubt that they would soon resume the payment of dividends. The Alamillos set was a very large one indeed, and when operations were first commenced by the company the place selected was called "La Madelina." This section of the property was wonderfully rich until they got down to the 70 fm. level, when the mine ceased to be productive of good results. Other places were then attacked, and some small dividends had been paid since that time. (Mr. COPLAND: Very small.) Not so very small, for he remembered the time when they had a 2*s.* dividend every half-year, which was equal to 10 per cent. on the capital, although that was not a dividend that he was satisfied with for a speculative concern, as all mines were more or less. The prospects of the mine were better now than they had ever previously been, and the only thing they wanted was an improved price for lead. In Alamillos, as well as in Linares, the raisings had been reduced, as the directors thought it would be a

pity to bring property to the market and sell it at a sacrifice, and it was owing to this policy that the operations of the half-year showed a small loss, but he was in hopes that the small loss would soon be turned into a profit. The Chairman then moved the adoption of the report and accounts.—Mr. PARTINGTON seconded the motion.

Mr. COPLAND thought the company was a most miserable affair, and he trusted that under the circumstances the directors would forego their fees, and thus reduce the loss by 200*l.* He would ask whether the large amount of ore raised and in stock when the report was sent had been sold yet?

The CHAIRMAN replied that it was in reserve, and he believed there was a better chance for the Alamillos Company than there had even been before.

Mr. COPLAND thought the charges might be reduced, and he could not see that the company had derived any benefit from the special inspection of the mine, which had cost them, according to the last balance sheet, 103*l.*

The CHAIRMAN, in reply, said although the accounts showed a loss of 541*l.* 14*s.* 8*d.* for the half year this loss would disappear if they took into consideration the 400 tons of lead ore in the mine. This ore was worth at least 8*s.* per ton, so that the 400 tons was worth at least 2400*l.* If the directors had not studied the best interests of the company they would have sold the ore and have shown a profit of 1000*l.* or 1200*l.* instead of a loss of 541*l.*, but by waiting for a time he had no doubt that this ore would realise from 3000*l.* to 2500*l.* The directors thought it better not to sacrifice the property for the sake of avoiding a temporary loss. As to the directors' fees, he held that cheap labour was bad labour, and that every man was worthy of his hire. He thought it was a great mistake to expect gentlemen to attend to the business of any concern without remuneration, and he thought it was a mistaken policy to adopt. The directors were all large shareholders, and the small amount of fees was quite inconsiderable in comparison to their other income in the company. He had no confidence in directors who worked for nothing.

The CHAIRMAN, in reply to a further question, said the last dividend paid was 6*d.* per share, or 2½ per cent., which absorbed 875*l.* The mine was inspected some months since by Mr. John Taylor.

The report and accounts were then unanimously adopted.

The CHAIRMAN moved the re-election of the retiring directors—Messrs. John R. Peill and John P. Judd.—Mr. H. D. ASBECROMBIE seconded the proposition, which was carried.

The CHAIRMAN then proposed the re-election of Messrs. Edward J. St. John and William Carter as auditors for the ensuing year.—Mr. PARTINGTON seconded the proposition, which was carried.

Mr. DONEGAN, in proposing a vote of thanks to the Chairman and directors, said it struck him that the directors deserved great credit upon the present occasion for having prevented a very much more disastrous state of things, which might have been expected. He was greatly surprised that the loss was so small, considering the price of lead, and he attributed that fact in a great measure to the judicious reductions which had been brought about by the visit of Mr. John Taylor.

(Hear, hear.)—Mr. WILDS, in seconding the proposition, thought it was very unfair for shareholders to blame the directors because, in consequence of the depressed price of lead, the accounts showed a small loss. He thought great credit was due to the directors for having prevented a much greater loss.

The proposition having been adopted, the CHAIRMAN returned thanks, and in reply to a question said the company had a reserve fund of 3889*l.*, which in consequence would bring 120*l.* a year, but this amount had been invested in the Cordova works, by which the company saved between 800*l.* and 700*l.* a year in the cost of smelting.—The proceedings then terminated.

FORTUNA MINING COMPANY.

The half-yearly general meeting of shareholders was held at the office of the company, Queen-street-place, on Thursday.

Mr. ROBERT HENTY in the chair.

Mr. HENRY SWAFFIELD (the secretary) read the notice calling the meeting, and the report and accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said the few observations he had to make would have more reference to practical matters than to the reports which had been circulated. Referring to an observation which had been made by a shareholder at the meeting just held of one of the other companies, he said it was meeting out rather a hard measure to the directors that, after having had so many agreeable meetings of the

Fortuna, at which handsome dividends were declared, now because they had an unaccountable depression of prices, and they had to struggle against misfortune which no human effort could overcome, shareholders should come here and lay the whole fault upon the directors. With regard to the small amount of profit which had been made, he could testify to the fact that that was not altogether from the mine, but from the great economy at the mine. He was at the mine three weeks ago, and visited every part of it, and saw all the engines, machinery, workmen's houses, shops, and so on, and he had no word of fault to find with the management there; on the contrary, he thought an immense amount of credit was due to the manager there, who, acting in concert with the directors here, as with Messrs. Taylor, the managing directors, had carried out numerous economies, but for which the company would not be in such a good position.

He rode over the mountain with Mr. Tonkin, the managing director, who pointed out several mines which had stopped work, not being able to make the operations pay. The town of Linares, which at one time contained 40,000 inhabitants, had now been reduced to about 20,000. At one time about 12,000 people went out of Linares because they had no occupation. Some of the mines which were pointed out to him were closed, and others had reduced their workings. The men formerly employed there had been scattered over the country. Of course, the mines which had thus been shut up, or partially closed, must deteriorate in condition.

He thought Mr. Tonkin had done admirable work, and deserved the highest credit. Mr. Tonkin pointed out that if the mine were shut up the world would be the poorer of the men who had been with the company from the time the mine was opened, 25 years ago, and the mine would also get into bad condition; Mr. Tonkin, therefore, called the men together, and pointed out that if the works were to be carried on they must submit to some abatement. This the men agreed to. It had been necessary to discharge some of the men, but a sufficient number had been kept to raise a quantity of ore, which enabled them to make a profit, and declare a dividend. The condition of the mine had been fully maintained, and the miners were receiving 10*s.* 6*d.* per week, surface men from 10*s.* to 1*s.* 3*d.*, according to qualifications, women about 10*s.* and boys about 8*d.* a day, which were as low wages as they could be expected to work for. He could testify that the shafts and engines were in first-rate condition, and he could find no fault with any of them. He saw the lead being washed for the market, and noticed that the works were being carried on with very great economy, and without much assistance for manual labour, except in the picking of the ore. In the utilisation of the water, which was rather scarce, the greatest economy was exercised. He went on to refer to the waste and barren character of the country, but said the employed seemed to be cheerful and satisfied with their condition. He should very much like to see a library established for the men. (Hear, hear.)

He had talked the matter over with Mr. Tonkin, who highly approved of the idea, as it would give the men some occupation in the evening after they had done their work. This was very desirable, as in Linares gambling was one great vice, and women another. He, therefore, hoped that any of the shareholders who had any rare books of an interesting and instructive kind would send them on to the office, when they would be packed up and sent over to the mine for the use of the men. After thoroughly inspecting the underground and surface works at the mine he went over to the Cordova Works, and was not only perfectly satisfied with what he saw, but was highly satisfied with the nature of the mine. There he hoped the shareholders would not go away with the impression that because they were only paying a small dividend the mine was going to the bad. He was satisfied such was not the case. He was a large shareholder, and, of course, was disappointed that the dividend was not larger, but not only had he not lost confidence in the mine, but after what he had seen his confidence was increased. (Loud cheers.)

Mr. W. Cox seconded the resolution, which was put and carried without any discussion.

On the motion of Mr. W. Cox, seconded by Mr. BRAMWELL, C.E., the retiring directors, Mr. Robert Henty and Mr. John R. Peill, were re-elected.

The Chairman and Mr. Peill acknowledged their re-election.

On the motion of the Chairman, seconded by Mr. W. Cox, Mr. E. J. St. John was re-elected an auditor.

On the motion of Mr. PARTINGTON, seconded by a SHAREHOLDER, Mr. Richard Donagan was elected an auditor in the place of Mr. J. T. Dorington, resigned.

Mr. R. Donagan acknowledged his election.

Mr. JOHN TAYLOR moved the following resolution:—"That the board be, and is hereby, authorised to purchase and work, out of the present reserve fund, such mine in Spain, in the vicinity of the Linares district, to the amount not exceeding 5000*l.* as the board, in its judgment, shall determine." He said that the board had had suggestions from several shareholders to the effect that the reserve fund, instead of being invested in the ordinary way, should be employed in the purchase of some additional mining property. Unfortunately they all knew the mines were terminable annuities, and although he believed that in Fortuna they had the best set of mines in the district, and were still opening up fresh ground, still there must come a time when the best bunch of ore must wear out. They were now raising tons of clean ore per month, which was a very large production to continue, but what the directors wanted was to be able to see their way to a continuance. The particular mines which had been offered to the directors could be bought for a less sum than was named in the resolution. They were in the Siles district, north of the Fortuna, and adjoining the Wana Ventura, which could assist each other, as one general manager could look after both. It was the opinion in the district that the mines were very valuable, but they would be able to judge of that by-and-by. Mr. Henty, when he was there, saw rich ore coming out of one of the shafts. As he had said, several influential shareholders had suggested that this was a good time to buy. He was glad that Mr. Henty had been over there, and had been able to testify that there was such a place as the Fortuna Mine—(a laugh)—and had also been able to testify that the mines were in good order, and were well and carefully managed. In Capt. Tonkin they had an agent who was second to no man. He did not know a mineral manager or agent who was superior to Charles Tonkin. He believed Mr. Tonkin began his life as a working miner. Mr. Tonkin wrote a beautiful letter, and was thoroughly capable of conducting the whole of the business there. Beyond that Mr. Tonkin had the confidence of the whole district; people brought him money without scruple, and took his bills upon the directors here. He had no difficulty in finding cash for his payments, which were very large, he understood the whole business of mining, and was conducting the smelting operations extremely well. He was also a good judge of steam-engines and pumping works, and he did not, as he had said, know a superior agent to Mr. Tonkin. It was a great matter of satisfaction, and a great thing to find first of all an honest man, and next a capable man; there were a great many who held considerable positions in mining matters who were neither one nor the other. (A laugh.) In the Fortuna Mine they had a large extent of ground still to explore, but they had powerful machinery which would take them down a considerable distance. The three concerns—the Linares, the Alamillos, and the Fortuna—were in a most satisfactory condition, and if times were to improve, and they could get a better price for lead, there was no reason why they should not return to very considerable profits. The cost of working had been very materially reduced, and the men had been very reasonable, and had been got down to a low rate of wages.

Mr. W. Cox seconded the resolution, and also pointed out the great desirability of having additional property to work upon when the time arrived (which he

did not anticipate would be for a very long time) that the Fortuna was worked out. The shareholders could not do better than invest a portion of the reserve fund in a property which was likely to turn out well, and which could be worked at a small cost per annum without in any way crippling or interfering with the present property.

Mr. BRAMWELL (an original director of the Fortuna Mine) strongly supported the appropriation of a portion of the reserve fund in the way proposed.

Mr. JOHN TAYLOR, in answer to a question, said that if the new property was acquired they would not be long in getting at the ore, which was at a shallow depth.

The resolution was then put to the meeting and carried unanimously.

A vote of thanks was then passed to the Chairman and directors.

The CHAIRMAN, in acknowledging the compliment, referred to the value of the services rendered by Mr. Toikin, and also testified to the high estimation in which he held him in the district.—Then meeting then broke up.

COTTON POWDER COMPANY (Limited).—This company held its ordinary annual meeting, on March 31, at the company's offices, Queen's Anne's Gate. The Chairman (Mr. J. Ramsay L'Amey) submitted the report and accounts for the year ending Dec. 31, 1878, which were deemed satisfactory, and duly received and confirmed by the meeting. The two retiring directors—Colonel W. Nassau Lees and Commissary-General Gardiner—were elected, also the accountants—Messrs. Smart, Snell, and Co.—Capt. H. H. Nicholson, R.N., was unanimously proposed as director to fill an existing vacancy. A vote of thanks to the Chairman was passed at the close of the meeting.

Registration of New Companies.

The following joint-stock companies have been duly registered:—

THE GREAT DYLIFFE MINING COMPANY (Limited).—Capital 20,000*l.*, in shares of 1*l.* The working of lead, copper, zinc, and other mines and minerals. The raising, dressing, and selling of lead, copper, and other ores and minerals, and the carrying on the business of miners and mineowners. The purchasing and acquiring, upon the terms of an agreement intended to be made, of the mines and premises comprised in a lease; and any lands, premises, plant, buildings, machinery, goodwill, &c., connected with the business of a mineowner. The subscribers (who take one share each) are—H. J. Alfred, Chiswick, captain; J. Browne, United University Club, reverend; H. E. Montgomerie, 17, Gracechurch-street, shipowner; E. J. Burgess, 32, Great St. Helen's, secretary; A. Field, 50, Leadenhall-street, wholesale stationer; W. S. Lampert, 1, Adelaide-place, clerk; B. M. Woolan, 119, Cheapside.

EAST ROMAN GRAVELS LEAD MINING COMPANY (Limited).—Capital 30,000*l.*, in shares of 1*l.* To purchase the interest of the West Tankerville Mining Company (Limited) in the mines now or lately worked by them, and the plant, machinery, stores, tools, and other effects connected therewith. To work, explore, develop, and maintain the mines, mineral properties, and works of the company, and to carry on the business of raising, working, mining, smelting, and selling lead and other ores, metals, and minerals in all its branches. The subscribers (who take one share each) are—J. M. Pimville, Clifton-road, gentleman; F. R. Hales, 74, King William street, solicitor; T. A. Goodall, Islington, law clerk; M. Marks, 58, Arnott-street, stock jobber; J. H. A. Smith, 8, Austin-friars, accountant; A. E. Cooke, 76, Old Broad-street, stock and share dealer; H. Verden, Kentish Town, secretary.

THE HARBORNE MASONIC HALL COMPANY (Limited).—Capital 5000*l.*, in shares of 25*l.* To erect and furnish a masonic hall at Harborne, and for public meetings, concerts, &c. The subscribers are—M. Barker, Edgbaston, 4; J. R. Lee, Birmingham, 2; S. W. Wainwright, Birmingham, 1; W. A. Phipson, Birmingham, 2; E. W. Bradley, Birmingham, 2; R. L. Crosbie, Birmingham, 2; C. T. Burt, Harborne, 4.

THE PALATINE PROPERTY COMPANY (Limited).—Capital 50,000*l.*, in shares of 10*l.* To purchase or otherwise acquire and hold, sell, exchange, let, and dispose of messuages, lands, hereditaments, and property of every kind, and to erect, construct, and build on same. The subscribers (who take one share each) are—J. T. Hall, Prescott; T. Heptenstall, Liverpool; H. Ganderton, Liverpool; J. Wallace, Liverpool; E. Heptenstall, Garston; W. Harper, Liverpool; D. Meek, New Brighton.

THE NATIONAL COFFEE PALACE COMPANY (Limited).—Capital 250,000*l.*, in shares of 1*l.* The establishment in England and Wales of coffee and cocoa houses, rooms, and other places where no intoxicating liquors shall be sold or consumed on the premises. The subscribers (who take one share each) are—E. R. Gunner, Great Cheverell; E. M. Tarr, Barnsbury; J. A. Alexander, Croydon; C. Tyler, 46, Commercial-road; J. Milne, 89, Gracechurch-street; F. Goatcher, 133, Blackfriars-road; T. Hungerford, 80, Bishopsgate-street Within.

THE RAMSGATE AND THANET STEAM-BOAT COMPANY (Limited).—Capital 10,000*l.*, in shares of 1*l.* To hire or purchase steam-boats to carry passengers and cargo to and from the Continent, and to all such other things as are conducive to the attainment of the above. The subscribers are—H. B. Hammond, Ramsgate, 100; E. Banks, Ramsgate, 100; L. W. Vaite, Ramsgate, 50; T. Moses, Ramsgate, 50; H. Dringebier, Ramsgate, 100; J. B. Hodgson, Ramsgate, 50; P. Page, Ramsgate, 50.

THE SOUTH KENSINGTON CO-OPERATIVE STORES (Limited).—Capital 20,000*l.*, in shares of 5*l.* The carrying on the business of a co-operative company for the supply of articles for domestic consumption and general use, also drapery, millinery, &c. The subscribers are—C. Brice, 32, Thistle-grove, 100; C. A. Latrobe, 188, Earl-court-road, 100; J. Barratt, Islington, 1; W. H. Cooke, 46, Queen Victoria-street, 1; O. R. Mason, Barnes, 1; M. Spiers, Camberwell, 1; D. Sullivan, 67, Highbury-quadrant, 5.

THE COMPRESSED AIR AND WATER ENGINE COMPANY (Boden's Patent) (Limited).—Capital 3000*l.*, in shares of 5*l.* To demonstrate a new motive-power, and afterwards to obtain patents in the United States of America, and all other places, disposing of the absolute rights in every country except the United Kingdom, where licenses will be granted. The subscribers (who take one share each) are—W. Wilkinson, Talgarth-road; H. Patten, Barnes Common; G. Smith, Kennington Park; T. Rogers, New Wandsworth; F. Thorn, Kentish Town; A. Hayell, Bermondsey; E. B. Masters, Leyton.

SHIPOWNERS' AND MARINERS' INSURANCE COMPANY (Limited).—Capital 5000*l.*, in shares of 1*l.* The insurance of vessels whether in port or at sea against wreck or casualty. The insurance of goods and cargoes. The subscribers (who take one share each) are—J. Walker, Moorgate-street; J. Widdicombe, Fulham; E. A. Ellerman, 80, Euston-road; Mary Jones, 34, Gloucester-road; A. King, Moorgate-street; H. Thompson, Moorgate-street; A. W. King, Highbury.

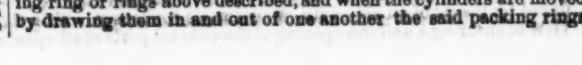
THE NONCONFORMISTS' CO-OPERATIVE ASSOCIATION (Limited).—Capital 50,000*l.*, in shares of 1*l.* To carry on the business of a co-operative society in all its branches. The subscribers (who take one share each) are—J. W. Williams, Holborn; J. J. Cheshire, 20, Cheapside; C. Lockwood, Lower Norwood; W. Allingham, Turnham Green; L. Salomons, 125, Piccadilly; A. Watson, 60, Queen Victoria-street; T. W. Booth, 55, Basinghall-street.

FAVILL AND COMPANY (Limited).—Capital 25,000*l.*, in shares of 10*l.* To purchase from Robert Favill, Market Rasen, brewer, a brewery there situate, with the plant, horses, wagons, &c., and to carry on the trade of brewers. The subscribers are—C. K. Tomlinson, Lincoln, 50; T. Martin, Lincoln, 50; W. T. Page, junior, Lincoln, 50; R. Favell, Market Rasen, 100; H. Campion, Faldingworth, 100; G. W. Favill, Market Rasen, 50; J. Taylor, Market Rasen, 100.

THE DARBY'S PATENT PEDESTRIAN BROADSIDE DIGGER COMPANY (Limited).—Capital 100,000*l.*, in shares of 5*l.* To purchase or otherwise acquire the patent granted to T. C. Darby for the invention of improvements in apparatus for cultivating land, and to manufacture the same. The subscribers are—J. O. Parker, Woodham, 20; J. Bateman, Colchester, 20; E. G. Strutt, Chelmsford, 20; J. T. Foster, Barnston Dunton, 25; G. B. Hilliard, Chelmsford, 20; J. Christy, Chelmsford, 10; H. L. Ling, Chelmsford, 10; G. Silvester, Little Waltham, 10; W. Brown, Great Leighs, 2; T. Francis, Maldon, 10; G. Phillips, Chelmsford, 4; G. A. Lowndes, Hatfield, Broad Oak, 20.

LONDON SILK DEALERS AND DRESS COMPANY (Limited).—Capital 20,000*l.*, in shares of 1*l.* To purchase and supply ladies'

to contain the packing. In the packing space is inserted the packing ring or rings above described, and when the cylinders are moved by drawing them in and out of one another the said packing ring



will be free to travel along the packing space, but will be retained therein by the flanges of the cylinders, the said flanges also preserving the connection between the cylinders. The divisions and ends of the improved apparatus are of similar construction to those of ordinary circular single and double blast bellows, and the improved apparatus is provided or fitted with suitable valves to govern the inlet and outlet of air, and can be operated in substantially the same manner as are those of ordinary construction. The apparatus above described is intended chiefly to be operated by manual power, but larger apparatus, to be driven by steam or other power, can be constructed substantially as above specified, or may be fitted with metallic or other suitable packing rings of ordinary construction.

COMMERCIAL INDUSTRY IN CORNWALL—BRICKWORKS.

In these times of such sad depression in mining neighbourhoods, consequent on the extremely low prices of metallic ores, &c., it is cheering to observe that at least one industry in Cornwall is likely to become permanently successful. We allude to brickworks, and putting aside the manufacture of fire-bricks, &c., for which the county has of late years become so eminent, both from the peculiar adaptation of its clays for fire purposes and from their inexhaustible supply, we may notice specially the Blue and Buff Vitrified Bricks and Tiles, manufactured by Mr. C. T. GILBERT at his works, Hingston Down, Gunnislake. These goods are made not only without straw, as were those manufactured by that ancient race of brickmakers—the Israelites—but absolutely without clay, and from a material that has until recently been considered worse than useless. This material is known by the name of killas, and a very large portion of Hingston Down is completely over-run with it; it is a soft, unctuous material after the manner of a clay-slate, and is very friable, especially after long exposure to the weather. There are two kinds of killas running through Mr. Gilbert's property, one of which is white, the other red; they each contain about 25 per cent. of alumina, while the white contains the greatest proportion of silica—about 65 per cent. to about 55 in the red, so that these materials are highly adapted for the manufacture of goods of a vitreous character; and while the white can be made to burn a light buff colour, the red, containing some 15 per cent. per oxide of iron, produces a splendid dark blue throughout the whole of the brick as well as on the surface, which is not the case with the majority of blue bricks now manufactured, but not only does the colour permeate the brick, but its non-absorbent and damp proof qualities are noticeable equally in the centre of the brick and on the exterior; this, of course, is a very great adjunct, rendering the brick so valuable for purposes for which an absorbent brick would be useless, and were this damp resisting property its only quality it would even then be of great value to the building trade; but there are, secondly, its utter imperviousness to the action of atmospheric and other gases, thereby almost defying the ravages of time on buildings in which these bricks have been used; thirdly, its entire resistance to the action of acids and other chemical agencies, thereby rendering it most valuable in the constructing of tanks, &c., and for chemical purposes generally. And last, but perhaps not least, is its unparalleled strength, as from a certificate now before us from Mr. Kirkaldy's testing works, London, we notice that these bricks have recently resisted a gradually increasing thrusting strain of nearly 400 tons per square foot; this resistive power renders them specially useful for paving purposes, and following in the wake of the railway companies who are using them largely for their platforms, not a few local board authorities are beginning to see in their use a large saving to their constituents, the ratepayers, and no wonder, for this killas appears to be adapted to no end of useful as well as ornamental purposes. Thus, from its damp proof and utterly non-absorbent qualities, we have bricks for chimneys, string courses, dockwork, deodorising beds, reservoirs, tunnels, sewers, chemical tanks, and the like, while from its resistance to pressure and wear and tear, we find it unequalled as a paving for stables and yards, for the manufacture of chequered and other tiles for railway platforms, footways, garden paths, &c., also for pitching, kerbing, channeling, and street purposes generally, while the saving in the cost is also a desideratum, and not likely to be overlooked, being only half the cost of granite paving and Yorkshire flagging. Among the local places where this paving may be seen in use may be mentioned Exeter, Plymouth, Launceston, Callington, &c.; it is also being used in some of the Government works, among others the Royal Arsenal at Woolwich. We understand the manufacture of these goods from killas is protected by Royal Letters Patent, and considering the benefit which such an industry is calculated to confer on a locality which would otherwise be dependant on mining, and that a large industry is gradually growing which has hitherto been unknown in the West, we cannot but heartily congratulate the spirited proprietor on his success.

IMPROVED STEAM-PUMPS.

An essential feature in the invention of Mr. S. HOLMAN, of Lawrence Pountney-lane, consists in operating the steam distributing valve of a steam-pump by means of the motive steam itself, the resistance being partially removed by reducing the pressure within the cylinder by the condensation or exhaust of the motive fluid. He employs a double-headed piston, the two piston heads being connected together, and he forms in the cylinder two outlet ports, which are covered and uncovered alternately by the two respective heads of the piston. The steam distributing valve which he prefers to employ is a piston valve, and he forms steam passages through the same, so that the steam shall have access around the middle, and thence to both ends of the valve, thus preventing all friction caused by pressure of steam on the exterior surface of the valve. The valve chest in which this valve works is formed with ports leading into the cylinder, of considerably greater area than any of the steam inlet ports, and the two steam outlet or exhaust ports from the cylinder are also of considerably greater area than any of the steam inlet ports. The said steam outlet or exhaust ports from the cylinder open into the water inlet pipe or passage of the pump, and as each of the pistons uncovers its respective exhaust port the steam is condensed, and the pressure on the corresponding side of the steam distributing valve is suddenly reduced, thereby enabling the steam at the opposite side of the steam distributing valve to impel it to the other end of the valve chest, and thus close the inlet port which has been opened, and open the other for the admission of steam to the other piston, and so on in succession.

At each end of the valve chest a cone or projection may be fitted for the purpose of restricting the orifice of the valve as it approaches each end of its stroke. In some cases, as for example, when the pump is used as an injector for feeding boilers, the pistons and their rods are made hollow for the passage of the water which is admitted into their interior through perforations in the sides of a neck connecting the two pistons' heads, the ends of the hollow piston rods being in this case fitted with suitable valves. In order to relieve boiler feeding pumps either of his improved construction, as hereinbefore described, or of other constructions, he employs in combination with the pump a suitable back pressure valve, and a steam chamber in conjunction therewith, so that by the introduction of a jet of steam directly into the said chamber, in such a manner that it shall be caused to act directly on the fluid set in motion by the pump, a considerable portion of the duty will be performed by the said jet, and a corresponding degree of pressure removed from the pump, thus contributing materially to the durability of the pump details, and augmenting the power of the pump.

When the pump is not used directly for feeding boilers a single piston of sufficient length may be employed, and the steam may be exhausted into the atmosphere or into a condenser, or into an additional cylinder, by which means a simple compound engine may be produced, the two exhaust ports of the first cylinder being connected respectively with the two inlet ports at opposite ends of the second cylinder. When this arrangement is adopted he can employ a double-heading piston, the two piston heads being fitted with valves opening towards the exhaust, so that a vacuum may be produced by means of an air-pump, or automatic condenser. With the view of ensuring a uniform opening of the exhaust ports at all speeds

a fly-wheel may be used, to which one of the piston rods may be connected.

Another part of the invention consists of a quadruple-acting pump, which may be employed in combination with the apparatus hereinbefore described when used as a steam engine, or with any other suitable motive-power engine. In carrying out this part of the invention he employs a divided or double cylinder, and two pistons mounted on one and the same piston rod, and arranged by means of suitable passages in connection with two sets of valves, such as are used in double-acting pumps working with a single piston. By this means he obtains a quadruple action, as at every stroke each of the two pistons draws through one valve and discharges through another,

ELECTRICAL METALLURGY—ATOMIC SILVER.

Although electrical metallurgy has not hitherto proved remunerative to those practising it, Mr. ALMARIN B. PAUL, of San Francisco, still maintains that it can be turned to profitable account. In a communication to the Mining and Scientific Press he explains that we cannot apply the same rule to silver as to gold, though both are precious metals, and for the reason that while gold is a simple, silver, to a great extent, is a compound—in other words, not universally in a metallic condition. The great value in the Comstock ores (outside of gold) is in metallic silver, and there is no reason why much of it is not in an atomic condition, though he does not think as universally so as gold. By experiments he has satisfied himself that there is in all ores a much larger percentage of metallic silver than is usually credited to be, and besides there is a great deal of ore considered "rebellious" silver ore that can be worked in consequence of its large per cent. of metallic silver, to a much greater profit without fire than with it; this he applies more particularly to lower grade silver ore. There is too general an opinion that because an ore may carry a large per cent. of silver the only successful way to treat it is to chloridise. He admits a better per cent. may be obtained, but will not admit that in all ores it is a ways the best way or the most profitable. In this age we work more for profit than per cent., glory, or science. One reason there is such a general resort to the roasting of silver ore is some carry the "base" metals, as lead, zinc, antimony or copper, and as all must be worked "like they work the Comstock," where the ores are entirely dissimilar, the result is they produce very base bullion, besides vitiating the mercury, and making, in consequence, a heavy loss of mercury and silver. To avoid this "fouling" and baseness of bullion, they say the ores must be roasted. Thus far, they are right, but by a change of operation, and not "work like the Comstock," all the expense of roasting might be avoided, and as good result, with merchantable bullion obtained.

As to the progress and results he has made by his radical treatment of ores Mr. A. B. Paul states that he has determined (1) that what has been deemed a myth of alchemical science to be a practical fact—that there is such a thing as "philosophical mercury," as the alchemist called it. In practical wording, that mercury can be placed in such a condition as to have affinity only for gold and silver. In other words, that he can work ores containing gold, silver, lead, antimony, zinc, copper or arsenic, as a whole or singly, with the precious metals, and amalgamate only gold and silver, and produce bullion finer than coin, and oftener above 950-1000 fine than under it, and will prove it can be done on a scale of 100 tons a day as easily as 100 lbs. (2) That the large body of silver ores now put through the process of roasting can be more profitably worked without it, and all bullion be free of base, or rather, 950-1000 fine. (3) That by the disintegration of ores and chemical applications, he can generate, in a practical amalgamating machine, so much electricity as to defy the strength of the strongest man—not only that, but be dangerous to handle. (4) That he will amalgamate gold so fine that paper can be gilded with it. (5) That there is no such thing as gold being in any other condition than metallic—in other words, that gold is a simple. (6) Taking ores from any of the leading gold mines of California, do not get on an average, 40 per cent. of the full value of the ore. (7) That the majority of mills of California working as above do not average one-third the value of the ores, and that the great bulk of the gold lost is atomic gold, and gold so fine that paper can be gilded with it in its natural state.

SULPHATE OF ALUMINA.—In the manufacture of this substance Mr. A. A. CROLL, of Coleman-street, proposes to employ several saturating or combining vessels, in all of which the like process is proceeding at or nearly the same time. Each of these vessels he finds it convenient to form of dimensions such as to operate on as large a charge in each as convenient, but one of the severals is, however, sufficiently large to contain the matter not only of one charge, but is also in addition capable of containing the contents of the other vessels, and these others are so placed in position that their contents may be readily discharged into the larger vessel. Each of these vessels is by preference surrounded by non-conducting material so as to prevent as much as possible the escape of the heat therefrom. When the whole of the clay intended for each vessel has been added to the acid therein he covers such vessels with wood supporting a layer of charcoal, or with other suitable non-conducting material. When, or even before, rapid ebullition has ceased in the respective saturating vessels he discharges the contents of each of the smaller ones into the larger one, care being taken to avoid the escape of the material by ebullition from the larger vessel. This larger vessel with its combined mass is maintained at its highest point of heat, or as nearly so as possible, for several hours by means of a surrounding non-conducting jacket, or medium of charcoal, or woollen or similarly non-conducting material, and by a wooden or other suitable non-conducting cover for the purpose of maintaining the fluidity of the mass. Supposing the quantity of material at any one time under operation to be about 15 tons, the desired operation is generally effected in about twelve hours, upon which he proceeds to open sluices in the vessel at three or four other number of different points in the height of the material therein, and at about equal distances apart in such height. From these openings he allows the sulphate of alumina to flow, or it is drawn out in succession, commencing with the highest, and it is then when cooled collected in a condition favourable to its ready and cheap reduction to small pieces suitable for commerce. The time during which such heat is maintained will vary with the quantity of material for the time under

operation, the object being to maintain a high degree of heat, so as to secure the desired fluidity of the material as long as possible. He would also state that although he prefers to employ several vessels in which the operation is simultaneously proceeding he does not confine himself to such use, as one large vessel may be employed.

MANUFACTURE OF TIN-PLATES.

According to the present system of preparing iron-plates for coating with tin, &c., the process adopted is that when pickled they are swilled, and from thence packed into the annealing box wet, and thence into the furnace to be annealed and prepared for cold rolling. Now, after pickling the plates, using portable grates or racks, they (together with the racks) are, according to the invention of Mr. G. NURSE, of the Redbrook Tin-plate Works, Gloucestershire, then immersed in hot water, and thoroughly swilled, and moved direct from the water into a revolving stove of special construction. When taken out of the stove the plates are removed from the racks and taken to the rolls, so that the plates shall be as solid as when (as at present) they are put in, after cold rolling for the second annealing, the advantage gained being that by passing them through in this way, the plates are annealed much quicker and have a better surface for cold rolling the second time. In some cases the plates are removed from the racks and placed direct into the annealing pot without first being passed through the rolls, as before described. By this system of drying the plates he is enabled to prepare the plates for tinning or coating with but one annealing (i.e., cold rolling) a sufficient number of times to present a surface for tinning or coating. If the plates are to be cold rolled direct from the pickling for the annealing, he prefers to put them in a chamber or stove in a suitable manner, so that the gas is eliminated from the plates, and afterwards the cold rolling takes place, the plates issuing from the rolls without blister.

The advantage gained by first cold rolling the plates is that compared with the old system of annealing more plates can be placed in the pot after black pickling, and further the plates can be annealed at a much lower temperature, and consequently a saving of annealing pots is effected. The stove which he prefers to use is constructed with a turntable moved by suitable means, such as a hand wheel, the heated air passing between the plates as the table revolves; or, in certain cases, other modes of putting the table in motion may be used. In some cases he makes arrangements for forcing hot air between the plates in the racks, and thus dispenses with the use of the stove, and he sometimes anneals the plates direct from the openers before pickling. After pickling they are dried in the manner before described, but they may be put into a stove or chamber after being discharged from the racks of the first stove, and then placed in rows, or one above the other, in the chamber before described, to eliminate the gas previous to cold rolling. One important object in annealing the plates direct from the openers or mill is to burn a portion of the oxide or scale off the plates, so as to be enabled to use much less vitriol or other acid.

STRENGTH OF MATERIALS.—Considerable interest was taken by the engineering profession in a series of valuable and interesting articles by Mr. WILLIAM KENT, M.E., published a short time since in Van Nostrand's Eclectic Engineering Magazine, and it will be gratifying to a very large number of readers to learn that it has now been reprinted as one of the volumes of Van Nostrand's Science Series—The Strength of Materials (London: Trübner and Co., Ludgate Hill)—carefully revised by the author. Mr. Kent mentions that he has made the subject of the treatise a hobby during the past four years, and has become profoundly impressed with the lamentable want of information, especially among manufacturers and users of materials of construction concerning the proper method of testing, and also with the lack of a standard method among professional engineers. Work undertaken in this way is usually well done, for neither time nor labour is spared to ensure success, and the results obtained by Mr. Kent makes good the rule. It is in the hope of more widely diffusing correct information that he has written, and he has, therefore, been careful to make the details given at once elementary and practical. Mr. Kent very truly remarks that every professional engineer has, or should have, access to a library of volumes containing records of experiments made for more than a century past upon known material of construction, together with mathematical and logical discussions of various theories of strength and resistance, sufficient to enable him to design and proportion structures with that rough approximation to accuracy and economy of material which is at present allowed in most branches of engineering. He admits the great professional skill of the American bridge builders, but referring to general matters he says that in the large majority of constructions this care is not taken. In many cases engineers are not employed at all in designing structures, and in a certain degree every man is his own engineer. This is especially true in the construction of ordinary buildings. The results are in most instances a reckless waste of constructive material, and frequently a want of correct proportioning; heavy pieces are placed where light ones should be, and vice versa. The waste of constructive materials annually he estimates at millions, and, on the other hand, the cost of saving material where it should not have been saved has too often been the sacrifice of human life. Mr. Kent treats the whole matter popularly yet systematically and scientifically, and wherever superior engineering assistance is unobtainable the application of the instruction given will be of inestimable value.

RAISING SAND FROM CHINA CLAY WORKS.—The apparatus invented by Mr. J. F. PAGEN, of St. Austell, consists of a number of cups or buckets of iron, steel, or other suitable material, attached to endless chains or bands working over two drums, one placed at the bottom and the other at the top of the clay pit. The sand is carried under the bottom drum by a stream of water (containing the clay in solution), and the buckets meeting it carry it up to the surface and discharge it over the top drum into a wagon or any suitable receptacle that may be provided for it. The water, with the clay in solution, passes in, and is pumped from the bottom of the pit in the usual way. When required suitable rollers are fixed between the top and bottom drums to carry the chains, to keep them from "bagging" too much.

Mr. Francis R. Crawshaw, of Forest House, Pontypidd, has joined the board of the National Bank of Wales (Limited).

SAMUEL DENISON & SON'S WEIGHING MACHINES

ARE THE BEST IN THE MARKET FOR

ACCURACY, DURABILITY, AND DESIGN.

SPECIALLY ADAPTED FOR COLLIERIES, MINES, IRONWORKS, BRICKWORKS, AND RAILWAYS.

SPECIALITE!!—Pit-bank Weighing Machines, with our latest improved Double Steelyard Indicator. NO LOOSE WEIGHTS. Simplest and most perfect ever brought out.

REPRESENTED IN THE MINING DISTRICTS BY

WORKS

YEADON & CO., Albion-place, Leeds. Old Grammar School Foundry, Leeds

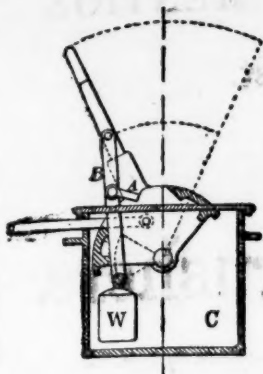
SWITCHES AND CROSSINGS,

FOR RAILWAYS AND TRAMWAYS, WITH PATENT LEVER BOXES.

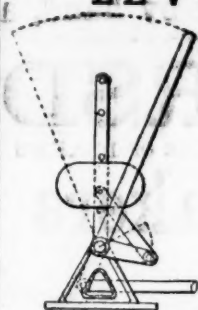
Hartley's Patent Lever Box.

REVERSIBLE UNDERGROUND,

Can be set to work either way; by turning over the catch at A and reversing the lever, the weight W swings over to C, the catch preventing its return until again turned over. The reversing is effected with very little power, as the weight is raised but a few inches in the operation.



HARTLEY'S PATENT LEVER BOX.

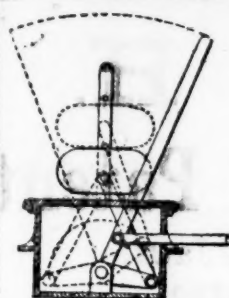


Specially designed for Colliery Workings, or where economy of space is an object. Is reversible, and can be locked either way, or dead-locked, so as not to work at all.

Hartley's Patent Locking and Reversible Lever Boxes,

HALF UNDERGROUND,

Will set over both ways, can be locked so as to work on one side only, or the switches can be locked on either side, so as not to work at all. Takes up less room than any other, as the weight does not turn over; works equally well if full of water; can be supplied at the price of an ordinary lever box.

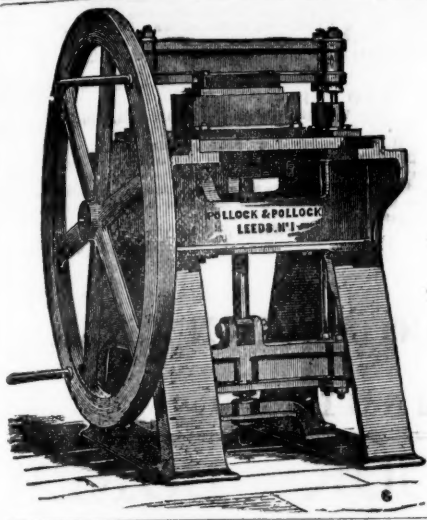


Tank Locomotives, Siding Stops, Wheels, Rails, Chairs, Spikes. Belts,

AND EVERY DESCRIPTION OF PERMANENT WAY FITTINGS.

Iron and Steel Pit Cages, Wrought-iron Roofs, Headgears, Girders, Turntables, Patent Coal Tip, Boilers, Engines, Water Cranes.

HARTLEY and ARNOUX BROTHERS, Stoke-upon-Trent.



POLLOCK AND POLLOCK,

LONGCLOSE WORKS, NEW TOWN, LEEDS,

POLLOCK'S PATENT BRICK PRESS,

The New "XL" Brick-Making Machines,

THE CHEAPEST AND BEST IN THE MARKET.

Improved Grinding Pans, with patent self-acting delivery.
Vertical and Horizontal Engines.

COLLIERY ENGINEERS.—WINDING ENGINES OF ALL SIZES.

POLLOCK AND MITCHELL'S PATENT KILNS are the Cheapest and Simplest.

London Office—155, Fenchurch Street, E.C.

GOLD MEDAL—PARIS EXHIBIT

1878.

HIGHEST AWARD FOR

English Pumping Machinery.

DIFFERENTIAL

PUMPING ENGINES.

HATHORN, DAVEY, AND CO.,

ENGINEERS, LEEDS.

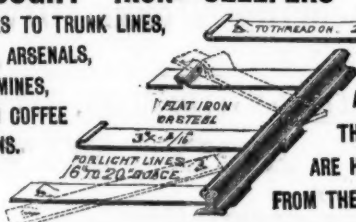
CATALOGUES ON APPLICATION.



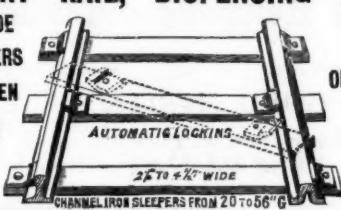
A NARROW GAUGE RAILWAY

WROUGHT IRON SLEEPERS TO FIT ANY RAIL, DISPENSING WITH SPIKES AND ALL LOOSE PIECES.

FOR FEEDERS TO TRUNK LINES,
QUAYSIDES, ARSENALS,
FORESTS, MINES,
SUGAR AND COFFEE
PLANTATIONS.



THE OUTSIDE
CLIPPING SLEEPERS
ARE LAID FIRST, THEN
THE INSIDE SLEEPERS
ARE HAMMERED UP AS
FROM THE DOTTED LINES.



7 MILLIONS
OF THESE SLEEPERS
ARE IN USE IN
ENGLAND, FRANCE,
GERMANY, BELGIUM.



FOR CONTRACTORS,
FORTIFICATIONS,
BRICKYARDS,
EARTHWORKS,
QUARRIES.

SOLE AGENTS,

SHAW BROTHERS,

BIRMINGHAM.

DRAWINGS & PARTICULARS ON APPLICATION. TO SAVE TIME, PLEASE GIVE GAUGE, WEIGHT OF RAIL AND KIND OF TRAFFIC.

BROADBENT'S

Patent Improved Blake Stone Breakers.

GUARANTEED NO INFRINGEMENT OF ANY PATENT.

AWARDED PRIZE MEDAL,

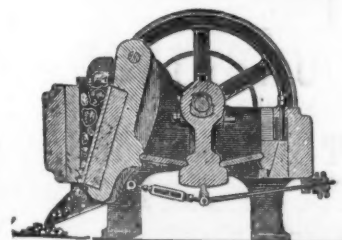
In competition with the best-known Stone Breakers,
September 7th, 1876,

Formerly Manufacturers for the late H. R. Marsden, having made
for him in less than four years 336 Stone Breakers.

ESTABLISHED 1836.

Prices and particulars on application to the Patentees and Sole Makers,—

ROBT. BROADBENT AND SON, STALYBRIDGE.



JOHN BEATSON & SON,
IRONGATE, DERBY.



IRON AND STEEL RAILS, of all sections, from 10 to 86 lbs. per yard, new perfect, new slightly defective, or second-hand, with Fish-plates, Bolts and Nuts, Chairs, Spikes, and Points and Crossings to match, when required.
STEEL AND IRON WIRE ROPES, LOCOMOTIVE ENGINES, &c., &c.
BARS, PLATES, SHEETS, &c.
STEEL OF ALL KINDS. PIG IRON OF ALL KINDS
Delivered at all Railway Stations and Ports in Great Britain.

At the PARIS EXHIBITION the Jurors have Awarded

THE GOLD MEDAL, THE SILVER MEDAL, AND HONOURABLE MENTION
FOR MY LATEST PATENTED STONE BREAKERS AND ORE CRUSHERS.

Stones broken equal, and Ores better, than by hand, at one-tenth the cost.

H. R. MARSDEN,
ORIGINAL PATENTEE AND SOLE MAKER OF BLAKE'S

Improved Patent Stone Breakers & Ore Crushers.

New Patent Reversible Jaws,
in Sections, with Patent
Faced Backs.

NEW PATENT ADJUSTABLE
TOGGLES.

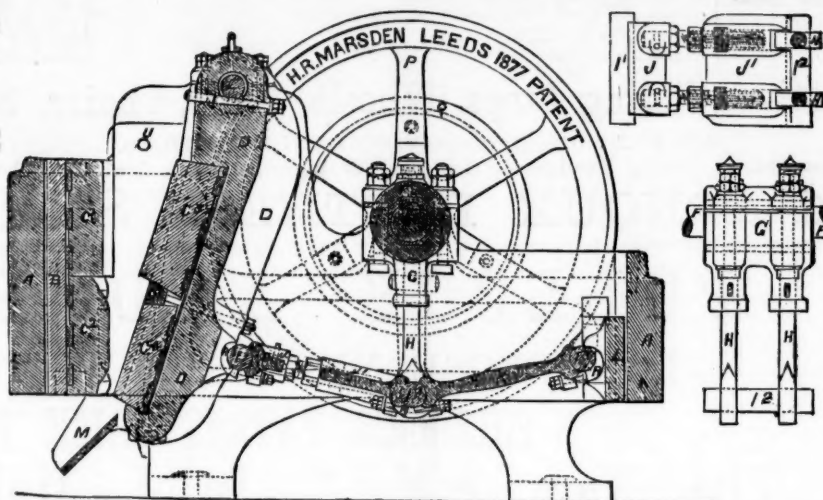
OVER 2500 IN USE.

New Patent Draw-back
Motion.

NEW PATENT STEEL TOGGLE BEARINGS.

70

PRIZE MEDALS.



READ THIS—

Wharfedale Lime Works, Maryport, Whitehaven,
November 7, 1878.
H. R. MARSDEN, Esq., Soho Foundry, Meadow-lane, Leeds.
DEAR SIR,—The machine I have in use is one of the large
size, 24 in. by 12 in. The quantity we are breaking daily with
this one machine is 250 tons, the jaw being set to break to a
size of 2½ in. We have, however, frequently broken over
300 tons per day of ten hours, and on several occasions over
260 tons during the same period. The stone we break is the
blue mountain limestone, and is used as a flux in the various
ironworks in this district. We have now had this machine in
daily use for over two years without repairs of any kind, and
have never had occasion to complain of any inconvenience in
using the machine. I hope the one you are now making for
me may do its work equally well. The cost—including
ENGINE-POWER, COALS, ENGINEMAN, FEEDING, and all EXPENSES
OF EVERY KIND—is just 3d. per ton. Should any of your
friends feel desirous of seeing one of your machines at work,
I shall have much pleasure in showing the one alluded to.
I am, dear Sir, yours very truly,
WILLIAM MILLER.

AND THIS—

Wharfedale Lime Works, Aspatria, Cumberland,
July 11th, 1878.
H. R. MARSDEN, Esq., Soho Foundry, Leeds.
DEAR SIR,—We are in receipt of your letter of 4th inst. I
may just state that the stone breaker above named has been
under my personal superintendence since its erection, and I
have no hesitation in saying that it is as good now as it was
five years ago.
I am, dear Sir, yours faithfully,
FRANCIS GOULD.

GREATLY REDUCED PRICES ON APPLICATION.

ALL BEARINGS are renewable, and made of H.R.M.'s Patent Compound ANTIFRICTION METAL.

CATALOGUES, TESTIMONIALS, &c.

H. R. MARSDEN, SOHO FOUNDRY, LEEDS, ENGLAND.

The Barrow Rock Drill COMPANY

Are NOW PREPARED to SUPPLY their DRILLS, the ONLY
ONES that have been SUCCESSFULLY WORKED in the
MINES of CORNWALL. At DOLCOATH MINE, in the
HARDEST known ROCK, a SINGLE MACHINE has, since
its introduction in July, 1876, driven MORE THAN THREE
TIMES the SPEED of HAND LABOUR, and at TWENTY PER
CENT. LESS COST PER FATHOM.

In ordinary ends two machines may be worked together,
and at a proportionately increased speed. They are strong,
light, and simple, easily worked, and adapted for ends and
stopes, and the sinking of winzes and shafts.

The company are also prepared to SUPPLY COMPRESSORS,
and all necessary appliances for working the said Drills.

Apply to—

**LOAM AND SON,
LISKEARD, CORNWALL.**

BICKFORD'S PATENT
FOR CONVERTING
CHARGE IN



SAFETY FUSE
FIRE TO THE
BLASTING ROCKS &c.

Obtained the PRIZE MEDALS at the "ROYAL EXHIBITION" of 1861; at
the "INTERNATIONAL EXHIBITION" of 1869 and 1874, in London; at the
"IMPERIAL EXPOSITION," held in Paris, in 1866; at the "INTERNA-
TIONAL EXHIBITION," in Dublin, 1865; at the "UNIVERSAL EXPOSI-
TION," in Paris, 1867; at the "GREAT INDUSTRIAL EXHIBITION," at Al-
tona, in 1869; TWO MEDALS at the "UNIVERSAL EXHIBITION," Vienna,
in 1873; and at the "EXPOSICION NACIONAL ARGENTINA," Cordoba,
South America, 1872.



BICKFORD, SMITH AND CO.,
of TUCKINGMILL, CORNWALL; ADELPHI
BANK CHAMBERS, SOUTH JOHN-STREET, LIVER-
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